

Apple
Assembler Special

Computing Now!



Canada's Personal Computing Magazine
April 1985

\$3.25
MM70247

Survey of 200 Computers

When the chips are down...

- Shades for the IBM PC
- Built in Canada
- New Calls from Bell
- Multi-tasking



0

57438 70247

014030* JAN 87* CN03* *
K JOURNEAU
68 EASTON AVE
MONTREAL PQ H4X 1K8

New
Free
Software



The **BEST MK II** Super PC and XT Compatibility

Many New Added Features



The BEST 256K Mark II

As described above with 256K memory (using 41256 chips), Two 360K DS, DD disk drives, RS232 and parallel port, Real Time Clock, 7 slots, Phoenix BIOS, Colour Video and Disk Controller Cards, Keyboards and much, much more.

\$1759

The BEST 512K Mark II

As 256K Mark II but with 512K on board

\$1949

The BEST 10 Meg Hard Drive Mark II

As 256K Mark II but with 10 Meg Hard Drive (Supplied with one Floppy Drive. For second drive add \$200). **\$2695**

Look what you get as standard!

- Uses 8088 microprocessor.
- New Feature, 256K RAM as standard.
- New Feature. Comes with the latest 41256 RAM chips.
- Expandable up to 512K and more on main board using 41256 RAM chips.
- New Feature. 7 expansion slots, each being identical for the user to upgrade as required.
- New Feature. Fitted with 150W power supply so system can be upgraded to a hard disk without changing power supply.
- New Feature. Flip-Top case.
- DMA controller. Three of the DMA channels are available to the user.
- New Feature. Even most basic versions come with Parallel and Serial Ports and Real Time Clock.
- Half watt speaker.
- Pre-socketed for optional coprocessors such as the 8087 math processor.
- Keyboard Interface compatible with IBM compatible keyboards through a 5-pin DIN connector.
- Three ROM sockets are available to the user, one generally holding the Phoenix BIOS.
- New Feature. Reset switch.
- Timer/Counter used by the system for Real Time Clock, time base and for tone generation.
- Complete with the Phoenix BIOS, identical to that used by many of the large US companies manufacturing IBM compatible computers.
- Comes with two Slimline DS, DD 5 1/4" 360K Disk Drives.
- Colour Video (RGB and composite) and Disk Controller cards Included.
- 230V models available.
- 300 Day warranty.

Tape Drive option backup suitable for all systems **\$Call**

IBM is registered trademark of IBM Canada Ltd.

The BEST 10 Meg/512K Mark II

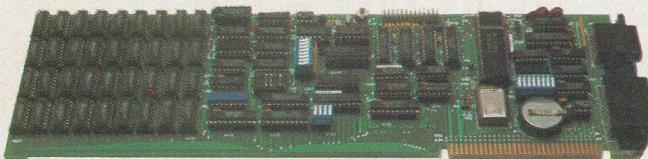
As 256K Mark II but with 10 Meg Hard Drive and 512K on board. (Supplied with one Floppy Drive. For second drive add \$200). **\$2895**

The BEST 20 Meg/512K Mark II

As 256K Mark II but with 20 Meg Hard Drive with 512K on board. (Supplied with one Floppy Drive. For second drive add \$200). **\$3395**

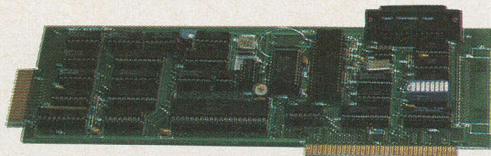
**See our 24-page Colour Catalogue In centre of this magazine
If it is missing or you require another copy, call or write**

The Best 256K PENTARAM BEST SELLER



\$359.00 with 256K RAM, Real Time Clock Parallel, serial and Game Port (512K now available)

FLOPPY CONTROLLER BOARD AND OPTIONS



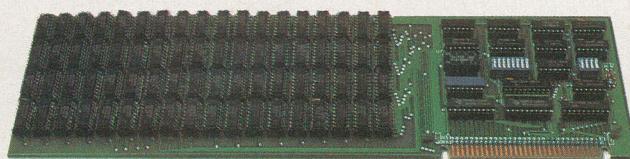
\$129.00 With Real Time Clock and Serial Port only **\$189.00**

EPROM Programmer **\$99.00**

(with ZIF Socket Adapter **\$159.00**)

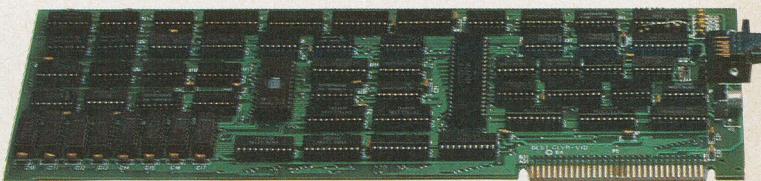
Parallel/Game Port **\$79.00** (cables Extra)

BEST 512K RAM BOARD



SPECIAL: \$365.00! with 512K. With 64K **\$179.00**

Colour Graphics Video Board



\$179.00 (Composite and RGB Output)

Quantity, Students and Teacher discount's available.



Exceltronix Computer Division Computers at unbeatable prices! (416) 921-8941, 319 College St., Toronto, Ontario

No returns or exchanges after 7 days. 15% restocking charge

Prices may change without notification

217 Bank Street, Ottawa (613) 230-9000

MST 152

1-800-268-3798 —
Order line only

EXCELTRONIX

Circle No. 3 on Reader Service Card

SURPLUSTRONICS

we will not be undersold

8088 Computer

The Price Barrier Smashed!
\$995

Includes:

- 8088 motherboard with 256K and all parts (except 8087)
- Phoenix Bios
- One 360K DS, DD disk drive and controller
- Power Supply with fan
- Flip-top case



All you need extra is a keyboard, video board and monitor.

8088 Motherboard only with 64K, fully assembled and tested, no Bios (one blank 2764). Expandable to 1Meg on-board memory. Flow soldered. Provision for 8087

\$299.00

6502 Systems

The Famous 6502 Board



- Assembled and fully tested (flow soldered)
- 64K, 80 x 24 video with soft-switch, floppy controller.
- System comes with blank EPROM'S on board, does not come with any proprietary software or Basic . . . **\$289.00**

Complete System

- 6502 board (as above) as illustrated with case, keyboard and power supply . . . **\$499.00**

Complete System

- Using 6502 board above in IBM style flip-top case, using powerful 75 watt power supply with fan, programmable serial keyboard adaptor, IBM style keyboard . . . **\$599.00**

As above with one built in disk drive . . . **\$789.00**

As above with two drives . . . **\$969.00**

Switching Power Supplies. +5V 5A, +12V 2.8A, +12V 2.0

Amps - 12V 0.5A (open frame) . . . **\$44.95**

Panasonic Printers (open frame) . . . **\$39.95**

PERIPHERAL CARDS FOR YOUR IBM AND COMPATIBLE COMPUTER

Colour Video Board **\$159.00**

Composite video or RGB Video

Floppy Controller **\$119.00**

Floppy Controller with RS232 **\$149.00**

Floppy Controller w. clock/RS232 **\$159.00**

Parallel and Game Port Card **\$59.00**

Cable and connector extra.

Peripheral Interface Card **\$139.00**

Includes two serial ports, parallel port, game port and provision for (but not including) real time clock.

Clock/Calendar Option **\$29.00**

With battery backup.

256K Multifunction Board

Includes: Serial port, parallel port, game port, provision for optional real time clock/calendar and socketed for up to 256K RAM.

With 64K RAM **\$175.00**

512K Board. Socketed for 512K including:

64K RAM **\$169.00**

IBM Compatible Disk Drives **\$185.00**

Brand New, fresh from factory. Shugart SA455 40 track, double sided, double density Slimline. We have ordered 10,000 from Shugart - that is why we can pass the savings on to you.

IBM Compatible Keyboards

Keytronics programmable (no case) **\$ 64.00**

Maxiswitch **\$129.00**

Cherry **\$129.00**

Case - High Quality

Hinged for easy access, can be supplied with plain back or for 5 or 8 slots. Please specify **\$74.95**

Above case with power supply and fan.

For Apple compatible (75W) **\$169.00**

For IBM compatible (150W) **\$219.00**

PERIPHERAL CARDS FOR YOUR APPLE & COMPATIBLE

Assembled, flow-soldered/cleaned and 100% tested

16K RAM Card **\$49.95**

80x24 video card **\$69.95**

Z80A Card **\$47.00**

Parallel Printer Card (cables extra) **\$49.95**

128K RAM Card with 64K **\$99.00**

128K RAM Card with 128K **\$139.00**

EPROM Programmer with Software **\$63.00**

(programs 2716, 2732, 2732A, 2764)

8" Floppy Controller **\$79.00**

Modem Autoanswer/autodial, touch tone or pulse dial. Plugs right into the system **\$69.00**

Apple Compatible Disk Drives (SA390) **\$189.00**

Case with numeric keyboard **\$129.00**

Power Supply (Hydro Approved) **\$69.00**

IBM is a registered Trade Mark of IBM Canada Limited Apple is a registered

Trade Mark of Apple Canada Limited

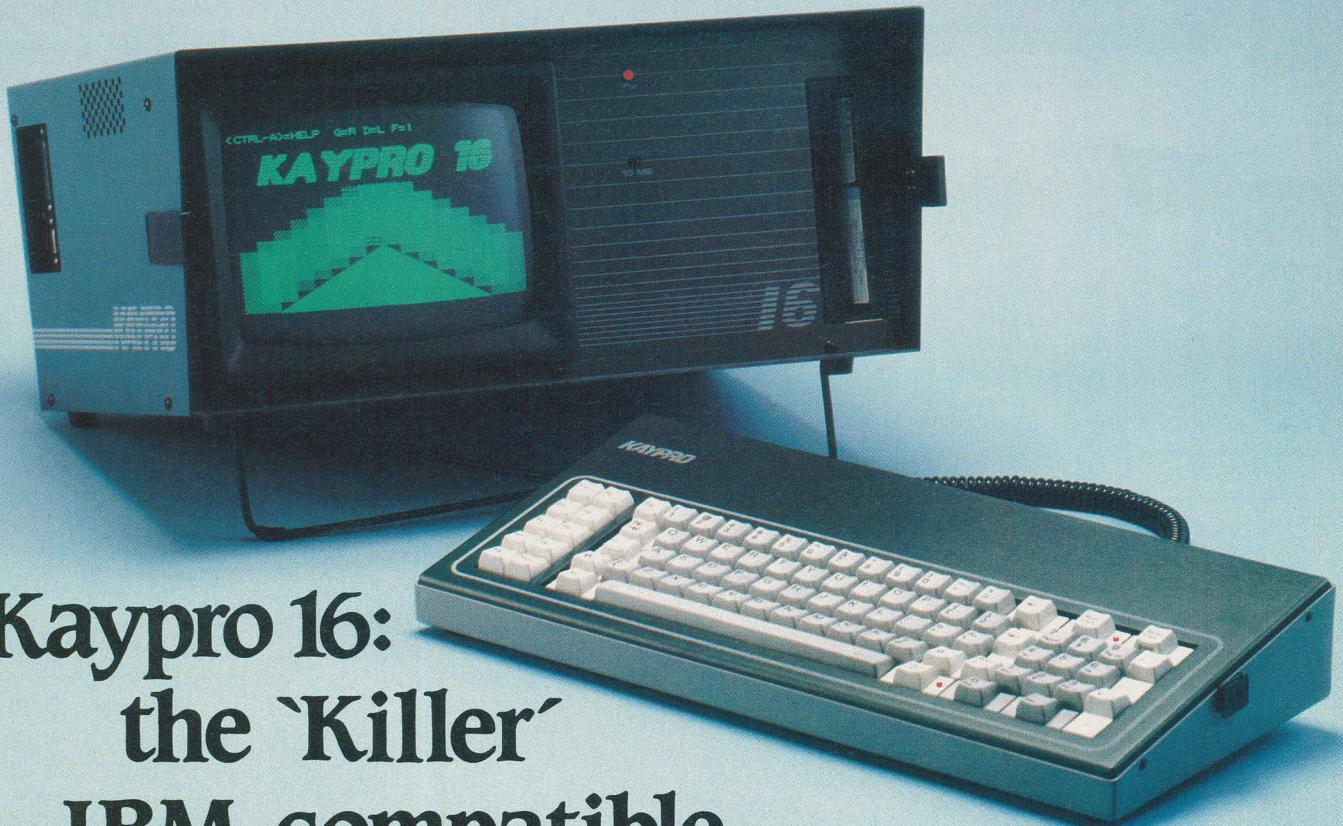
Mail Orders add \$5.00 minimum for shipping & handling. Ontario residents add 7% P.S.T. Visa, Mastercard and American Express cards accepted: send card number, expiry date, name of bank and signature. Send certified cheque or money order, do not send cash. All prices on this page are final sale. No warranty, No returns, No refunds but HUGE savings. Warranties available at extra cost.

Surplustronics, 310 College Street, Toronto, Ontario, M5T 1S3

More lines to serve you better

(416) 960-1350

Circle No. 29 on Reader Service Card



Kaypro 16: the 'Killer' IBM-compatible beats the competition

At a time when technical innovation is so abundant it sometimes causes a yawn, Computron is proud to introduce the Kaypro 16 to Canada.

Kaypro 16 has features even the most blasé will sit up and notice. The Kaypro 16 is totally IBM-compatible. It actually enjoys the so-called "Killer" software others choke on. And, the Kaypro 16 can safely boast the lowest price of all competitive systems on the Canadian market today.

If that's not enough, count the standard features:

- 10 Mb hard disk plus 360K floppy
- 256K Bytes, expandable to 640K Bytes without further memory board purchases
- Serial and parallel ports
- Built-in monochrome graphics screen with RGB and composite video interfaces built-in for use with an external colour monitor

- Totally IBM-compatible keyboard
- Comprehensive name-brand software including MS-DOS 2.11, GW-Basic™, WordStar™, MailMerge™, CalcStar™, InfoStar +™ (DataStar™, ReportStar, FormSort), StarBurst™ and MITE™ Communications – all with full interactive tutorials.

Now, you ask, what does all this cost? Just \$5195 or less.

Call or write today for a dealer near you and see for yourself why Kaypro 16 is a "Killer."

TORONTO: 55 Torbay Road
Unit #2, Markham, Ontario L3R 1G7
(416) 477-0828

HEAD OFFICE: 17507-107 Avenue
Edmonton, Alberta T5S 1E5
(403) 489-8400 Telex: 037-42881

Circle No. 53 on Reader Service Card

Computron

Computing Now!

Canada's Personal Computing Magazine

Vol. 3 No. 1
April 1985

Published by
Moorshead Publications
Suite 601, 25 Overlea Blvd.
Toronto, Ont. M4H 1B1
(416) 423-3262

EDITOR
Steve Rimmer

ASSISTANT EDITOR
John Rudzinski

DIRECTOR OF PRODUCTION
Erik Blomkwist

CREATIVE MANAGER
Ann Rodrigues

PRODUCTION
Douglas Goddard
Naznin Sunderji

CIRCULATION MANAGER
Lisa Salvatori

ADVERTISING DIRECTOR
Rick May
Montreal (514) 735-5191
Vancouver (604) 688-5314

Publisher: H.W. Moorshead; Executive Vice-President: V.K. Marskell; General Manager: S. Harrison; Controller: B. Shankman; Accounts: P. Dunphy; Reader Services: C. Wyatt, M. Greenan, H. Brooks, R. Cree; Advertising Services: D. Whitehead

©Moorshead Publications Ltd.
NEWSSTAND DISTRIBUTION
Master Media, Oakville, Ont.

PRINTED BY:
Heritage Press Ltd., Mississauga

SUBSCRIPTIONS
\$22.95 (12 issues) \$37.95 (24 issues)
Published 12 times a year

For US rates add \$3 per year.
Other countries add \$5 a year.

Moorshead Publications also
publish Electronics Today, Computers in Education,
and Software Now!

POSTAL INFORMATION

Second Class Mail Registration No. 5946.
Mailing address for subscription orders,
undeliverable copies and change of address notice is:

Computing Now!, Suite 601,
25 Overlea Blvd., Toronto,
Ontario, M4H 1B1



Printed in Canada ISSN 0823-6437.

A Byte of Apple Assembly

8

Survey of Systems

14



CP/M Disk Destroyer

41

New Calls from Bell

44

Concurrency on a PC

46

Shades for the PC

52

Built in Canada

58

Apple Assemblers

65

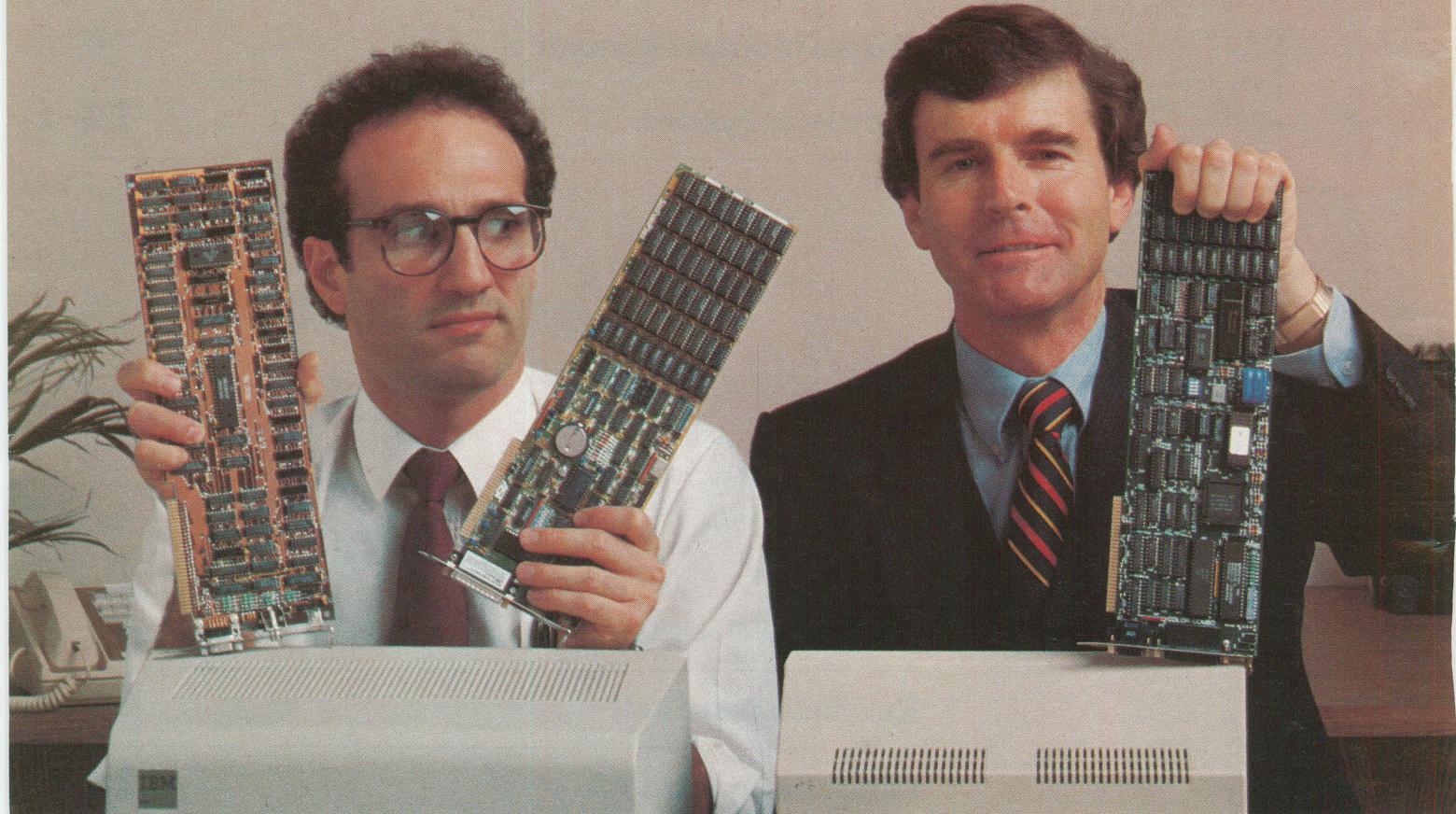
Index to Volume Two

70

Sectors

Computer Press	13	Advertising	63
Next Month	13	Almost Free PC Software Volume 2	64
Almost Free PC Software Volume 3	17	Consulting	64
Apple DOS Software	29	Technical Writing	64
Apple ZCPR2	35	Subscribe	71
Intuit	40	Product Mart	77
Almost Free PC Software 2	55	Ad Index	78

Looking for a product that combines display and multifunction on one PC board?



Don't give up. Persyst.

Introducing Color Combo and Mono Combo, a new breed of multifunction. You'd expect any multifunction board to pack memory, clock and I/O functions into one slot. Now you can expect more... the function of a SixPak™ plus monochrome or color on a single board, in a single slot.

Our new Color Combo and Mono Combo Cards are the only ones combining an IBM compatible monochrome or color display adapter with a parallel printer port, serial port, up to 384K of socketed RAM, RAM-Disk emulation, print spooling, and an optional clock/calendar. All on one board.

Advanced technology saves us space and saves you slots. Thanks to state-of-the-art custom VLSI circuitry, we were able to shrink the size of our color and monochrome display adapters. This gave us the space to put all the functions your PC needs onto one circuit board.

And, since you get everything you need on one board, you save expansion slots. So why fill up the slots in your PC, XT, AT or PC compatible with boards you don't need.

One board or two: It's that simple.

QUADRAM SOLUTION	AST SOLUTION	PERSYST SOLUTION
1. Quadboard + 2. Monochrome or Color Adapter	1. SixPakPlus + 2. Monochrome or Color Adapter	1. Mono or Color Combo Card
2 Boards/2 Slots	2 Boards/2 Slots	1 Board/1 Slot

And, our one board is fully IBM compatible. That means you can run all of your favorite software and use standard IBM or IBM compatible color or monochrome monitors. What could be simpler!

Persyst quality backed by a two year warranty. We go to great lengths to insure reliable performance and top quality.

Every Persyst board goes through one of the most stringent testing and quality assurance programs in the industry. So we give you one of the best warranties in the business: a full two years on every Persyst board.

Persyst products are manufactured by Emulex Corporation, an industry leader in high performance controllers, communication products and packaged subsystems for micros to super minis.

For more information call or write us today. Persyst Products, Emulex Corporation, 5945 Airport Road, Suite 288, Mississauga, Ontario, Canada L4V 1R9 Tele: (416) 637-1211, Twx: 610-492-4242.

In Canada call: (416) 673-1211

PERSYST
PERSYST
EMULEX
PERSYST

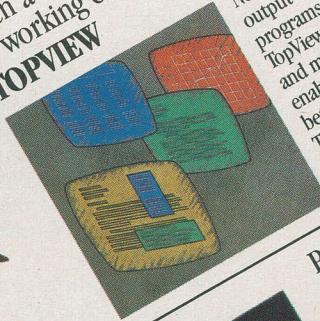
Easy to learn,
easy to use
IBM ASSISTANT SERIES

Saving you time
according to your
course as precise
as the
outline by this
method.

You'll get up to speed quickly with this low priced, high function integrated series of programs. You can use them independently or as a team. Whether you require word processing, data creation and storage, report capabilities, full colour graphing or a spreadsheet program, IBM Assistant Series helps you get down to business. Whatever your business need, you could probably use some "assistants".

IBM Personal Computer Software. Powerful programs with a definite business slant.

Open a window
to working efficiency
TOPVIEW



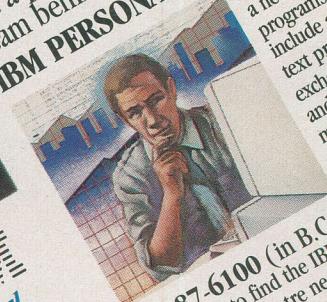
Now you can increase your output by working on different programs at the same time. TopView gives you a windowing and multitasking capability enabling you to switch between applications instantly. Think of the time you'll save. Open a window to the future with TopView.

For high function word processing
IBM DISPLAYWRITE SERIES



Set your sights high on this advanced text processing program. Menu-driven with an extensive range of text capabilities, IBM DisplayWrite is the right choice for anyone who uses an IBM PC for word processing. Get started today — move up to IBM DisplayWrite.

Put a powerful new 15 member team behind you
IBM PERSONAL DECISION SERIES



It's really 14 applications programs supported by a new data management program. Just pick the programs that best suit your needs. Applications include advanced spreadsheet modelling, reports, text processing and graphs. And you can easily exchange data with a host system. This command and menu-driven series offers the seasoned user more function than the IBM Assistant Series. IBM Personal Decision Series — the up to minute productivity tool.

1-800-387-6100

Call Toll-free 1-800-387-6100 (in B.C. 112-800-387-6100)
or for more information and to find the IBM Authorized Dealer
or IBM Product Centre nearest you.

Send today for more information!

I want to know more about:
 IBM Assistant Series TopView IBM DisplayWrite Series

IBM Personal Decision Series IBM Mills, Ont. M3C 2T6

Name _____
Title _____

City _____
Postal Code _____

Address _____
Province _____
Telephone _____

Mail to IBM Canada Ltd., P.O. Box 657, Don Mills, Ont. M3C 2T6
Phone IBM for more information Toll-free 1-800-387-6100 (in B.C. 112-800-387-6100)
Company _____
Note: These IBM Personal Computer Software products
are not available in Quebec.

CN707

A Byte of Apple Assembly

If you park yourself in front of an Apple for a while and start blasting away at the foundation of its bits and bytes

you will, in time...

having done enough coffee and questionable substances... meet the assembly language swamp dragon. It's not a pleasant experience. Here's a vorpal sword to fend it off with.

by Steve Rimmer

If I was going to be stranded in a deserted subdivision with only a computer for company I'd surely want an Apple. IBMs are great for doing business stuff on, CP/M based systems are actually useful... but Apples are funky and weird and a blast to meddle with.

The "operating system" of the Apple][+, such as it is, consists of a very bizarre fusion of the system's on board firmware and DOS, which kind of hooks its way into Applesoft and the F8 ROM and a few other unusual bits of code in there and begins to think about treachery. Unlike as in the case of the more sophisticated operating systems, DOS isn't particularly structured and rarely makes immediate sense when you start trying to work with it.

Also unlike as in the case of more powerful computers, an Apple running under DOS has a pretty bleak selection of programming tools. There are those two threadbare trolls, Applesoft and Integer BASIC... the relative disadvantages of programming in BASIC probably need not be enumerated here. There's Apple PASCAL, which is great

if you like PASCAL

and if all of your intended users happen to have it. Beyond this, for the most



part, there is nothing but the inky blackness of the great cosmic void, at the very far end of which there lurks the assembly language swamp dragon, fuming and snorting virtual fire.

The assembly language swamp dragon is one of the most unpleasant manifestations of uncool life forms around. It's eleven feet long from the tip of its venomous tail to the nose of any of its three heads. It has a revolting disposition. It eats over a dozen cats a day, which is its only positive quality. It hates anything that moves or thinks.

Due to a marriage of the assembly language swamp dragon and the 6502 microprocessor

... a union made in Taiwan ... assembly language programming on the Apple is a bit of pig's pith helmet. A lot of the really nice things that, say the Z80, lets you do with

your eyes closed are impossible on a fruit. Most

of the rest of the reasonably useful stuff is seethingly difficult.

It's not that hard to write little drivers which are called from BASIC and other minutiae of code for the Apple, but getting together really slick looking applications entirely in assembler is a bit of a party. Keeping them from looking like they could have been written better in BASIC with the computer switched off goes beyond the boundaries of a mere party into a full blown circus.

In this feature we are going to look at a few routines and other related tricks to make assembly language on an Apple a bit more manageable. While these bits may not banish the swamp dragon entirely, they should keep him partially doused.

Hot Stacks

With DOS up and running on a fruit there is actually a tremendous number of useful little things floating around up in high memory. While it would be wildly untrue to say that they are in any logical order up there, they do land in more or less the same places each time you boot the computer. As such, we can make use of them from other programs.

As DOS is, itself, a program, it is reasonable to assume that many of the things one wants to do in a program are already being done by DOS.

The following header is a good start for any assembler program. It has the advantage that is doesn't generate any code of its own... but it does give you easy access to a whole raft of useful DOS routines.

: INTRINSIC DOS ROUTINES

SETINV	EQU	\$FE80	;SET INVERSE MODE
SETNORM	EQU	\$FE84	;SET NORMAL MODE
CRLF	EQU	\$FD8E	;SEND NEW LINE TO TUBE
PUTCH	EQU	\$FDDE	;SEND CHR IN A TO TUBE
HEXBYTE	EQU	\$FDDA	;PRINT A AS HEX
HEXWORD	EQU	\$F941	;PRINT A & X AS HEX
SPACE	EQU	\$F94A	;SEND STRING OF SPACES X LONG



BEEP	EQU	\$FBE4	:TOOT THE SPEAKER
GETCH	EQU	\$FD0C	:GET ONE CHARACTER
GETS	EQU	\$FD6A	:GET A STRING FROM CONSOLE
SAVER	EQU	\$FF4A	:SAVE ALL REGISTERS
RESTR	EQU	\$FF3F	:RESTORE ALL REGISTERS
GOTOXY	EQU	\$FC22	:POSITION CURSOR
CLRSCRN	EQU	\$FC58	:CLEAR TUBE
DELAY	EQU	\$FCA8	:WAIT
;			
CR	EQU	\$8D	:CARRIAGE RETURN
RESHNDL	EQU	\$03F2	:RESET VECTOR LOCATION
WHEEL	EQU	\$52	:A USEFUL PAGE ZERO SPOT
STROBE	EQU	\$C010	:KEYBOARD STROBE
KEYBRD	EQU	\$C000	:KEYBOARD PORT
POINT	EQU	\$28	:POINTER TO CURSOR LINE
HORIZON	EQU	\$24	:POINTER TO CURSOR

Having told the assembler what these labels represent, we can call the routines in DOS as if they were subroutines of the program we're writing.

The functions of some of the routines are fairly easy to understand. For example, doing

JSR SETINV

will cause everything printed thereafter to come up in inverse video. You can call SETNORM to return the fruit to its normal screen mode.

The CRLF routine prints a new line on the screen when it's called.

If you load a character into the accumulator and

JSR PUTCH

it'll be spewed out on the screen. If you'd called HEXBYTE instead it would be printed as a hex number instead of a single character. HEXWORD does A and X as a four digit... sixteen bit... word.

The SPACE routine blasts out a string of spaces equal in length to the value in X. GETCH waits for a keyboard character and returns it in A. GETS accepts a string of characters from the keyboard, stashing them in the BASIC input buffer in low memory. The buffer runs from \$200 to \$2FF. It behaves a lot like the BASIC INPUT.

The SAVER and RESTR calls respectively stash all the 6502 registers in memory and suck them back out again. This is extremely useful when you want to call a subroutine but not trash the current register contents.

Calling CLRSCRN clears the screen. The DELAY call waits for a time determined by the contents of the accumulator. Delay loops are very useful in some sorts of programming... this one, however, doesn't exactly contort itself to be applicable to anything. The delay time for a given value in the accumulator can be figured as $1.0227 * ((26 + (27 * A) (5 * (N \wedge 2))) / 2)$ microseconds. It's a serious trip.

The remainder of the equates in the example I've stashed in here are ones which we'll be using for routines in a couple of minutes. The RESHNDL label is particularly useful, as it allows one to return to BASIC even if one isn't in complete control of one's stack.

Alternately, it can keep users of one's program from getting back to BASIC at all.

The RESHNDL location is a vector which the Apple jumps to when you hit control reset. If you write a program and want to return to BASIC when it's done you would normally do a final RTS instruction which would ideally pop the calling location of BASIC from the 6502's stack and zap you back to the tender mercies of Applesoft. This isn't always practical, for a number of reasons.

You can, in these cases, do what the reset key does by replacing the final RTS with

JMP (RESHNDL)

which will get you back to Applesoft.

You can, on the other hand, make the reset key do something else. If, for example, you wanted to make sure that the reset key didn't do anything final to your program, you could put a different address in RESHNDL. For example, put the address ERROR in it, where ERROR is the start of a routine like this one.

```
JSR ILPRT
ASC 'STOP HITTING THE RESET KEY, YOU WOMBAT'
DFB 0
JMP MAINMENU
```

This may not seem entirely fathomable yet... it will in a minute... but it obviously prints an error message if the reset key is pressed. As such, your program can retain control of the computer even if someone tries to reset it.

Not Enough Bits

Printing strings with a 6502 is a tedious undertaking. The 6502 lacks any general purpose sixteen bit registers, and, as such, one must fiddle with two of the eight bit ones to point to the string.

There is one sixteen bit register which you can use, however, although few programmers ever want to deal with it. The program counter can address any location in memory.

This is a routine which prints an in line string. If you call it... in the way I did in the reset handle a few seconds ago... and then place a string after it terminated with a zero it will print the string to the tube and return to execute the instruction immediately after the zero byte.

This is a bit of a sky wire act, to be sure. However, it works exceedingly well and makes printing messages from an assembly language program considerably easier than most of the normal techniques allow for. It also serves to imbed a lot of text in one's code at odd places, which makes the resulting code very difficult indeed to disassemble.

ILPRT	PLA	WHEEL	:GET THE LOW ORDER BYTE
	STA	WHEEL	:SAVE IT IN THE WHEEL
	PLA		:GET THE HIGH ORDER BYTE
	STA	WHEEL+1	:AND STASH THAT ONE
	INC	WHEEL	:POINT PAST THE DUMMY
	BNE	NOINCA	:BY DOING A SIXTEEN BIT
	INC	WHEEL+	:INCREMENT
	LDY	#\$00	:NULL OUT THE OFFSET
NOINCA	LDA	(WHEEL), Y	:GET A BYTE
LLP	CPM	#\$00	:ARE WE AT THE END?
	BEQ	IEND	:IF SO, SCOOT
	JSR	PUTCH	:OTHERWISE, PRINT THE BYTE
	INC	WHEEL	:AND DO A SIXTEEN BIT
	BNE	NOINC	:INCREMENT OF
	INC	WHEEL+1	:THE WHEEL
NOINC	JMP	LLP	:AND GO AGAIN
IEND	LDA	WHEEL+1	:PUSH THE POINTER
	PHA		:BACK ON THE STACK
	LDA	WHEEL	:TO SERVE AS
	PHA		:A RETURN ADDRESS
	RTS		

This code is highly strange.

When you call a subroutine... execute a JSR... the address of the next instruction the 6502 is to execute... minus one, as it turns out... is pushed onto the stack. Since the 6502 has an eight bit stack it's pushed up there one byte at a time.

In the case of calling ILPRT here, of course, the byte after the call is the first byte of the string. ILPRT can locate this by pulling the return address off the stack and incrementing it by one. If we stash this somewhere in page zero... the location I've called WHEEL... we can read the bytes from the string using zero page addressing and incrementing the WHEEL. When the end of the string is encountered the contents of WHEEL can get heaved back up on the stack... they point to the next executable instruc-

A Byte of Apple Assembly

tion, and the 6502 will be quite happy regarding them as a return address when ILPRT executes an RTS.

Aside from being rather elegant and slick, ILPRT makes writing large programs a great deal easier.

Here's a longer bit of code.

MENU	JSR	CLRSCRN	:CLEAR THE TUBE
MENUR	JSR	HOME	:HOME THE CURSOR
	JSR	SETNORM	:SET NORMAL VIDEO
	JSR	PAD	:CENTRE THE TEXT
	JSR	ILPRT	:SHOW THE TEXT
	ASC	MAIN MENU	
	DFB	CR,CR,CR,CR, 0	
	LDA	MENULN	:GET THE POINTER
	CMP	#\$01	:IS IT 1?
	BNE	NOTONE	:IF NOT, NORMAL VIDEO
	JSR	SETINV	:SET INVERSE MODE
NOTONE	JSR	PAD	:CENTRE THE TEXT
	JSR	ILPRT	:SHOW DE WORDS
	ASC	'OPTION 1'	
	DFB	0	
	JSR	PAD	:SHOW REST OF BAR
	JSR	CRLF	:GO TO NEW LINE
	JSR	SETNORM	:UNDO INVERSE
	LDA	MENULN	
	CMP	#\$02	
	BNE	NOTTWO	
	JSR	SETINV	
NOTTWO	NOP		
	JSR	PAD	
	JSR	ILPRT	
	ASC	'OPTION 2'	
	DFB	0	
	JSR	PAD	
	JSR	CRLF	
	JSR	SETNORM	
	LDA	MENULN	
	CMP	#\$03	
	BNE	NOTTRE	
	JSR	SETINV	
NOTTRE	NOP		
	JSR	PAD	
	JSR	ILPRT	
	ASC	'OPTIONS'	
	DFB	0	
	JSR	PAD	
	JSR	CRLF	
	JSR	SETNORM	
	JSR	HOME	:PUT CURSOR IN CORNER
GETOPT	JSR	GETCH	:GET A CHARACTER
	CMP	#\$8D	:IF, CR, QUIT
	BEQ	EMENU	:
	CMP	#\$88	:IF UP ARROW
	BEQ	INCMENU	:INCREMENT
	CMP	#\$95	:IF DOWN ARROW
	BEQ	DECMENU	:DECREMENT
	JSR	BEEP	:BAD OPTION...
	JMP	GETOPT	:GO AGAIN
EMENU	JSR	CLRSCRN	
INCMENU	LDA	MENULN	:SEE IF
	CMP	#\$03	:WE'RE AT
	BMI	INCM1	:UPPER OPTION
	JSR	BEEP	:IF SO, DON'T
	JMP	GETOPT	:INCREMENT IT
INCM1	INC	MENULN	:ELSE, BUMP IT UP
	JMP	MENUR	
DEC MENU	LDA	MENULN	
	CMP	#\$02	
	BPL	DECIM1	

DECIM1	JSR	BEEP	
	JMP	GETOPT	
	DEC	MEMULN	
	JMP	MENUR	
PAD	LDX	#\$09	:PAD OUT LINE
	JSR	SPACE	
HOME	LDA	#\$00	:HOME CURSOR
	STA	\$24	
	STA	\$25	
	JSR	GOTOXY	
	RTS		
MENULN	DFB	1	

This block of code handles a really slick looking menu. It will print up all the options on the screen with one of them in a reversed out bar. The cursor mover keys move the bar... hitting return selects whatever the bar is pointing to. You can add as many options as you want to this thing... up to the limit of the screen.

Unlike simply printing a list and selecting a number from it, this thing looks very professional and serious. It also allows one to set it up to be really convenient. As the bar will land on whatever entry is indicated by the byte at MENULN, you can have it default to the most convenient option by loading the appropriate value into this space.

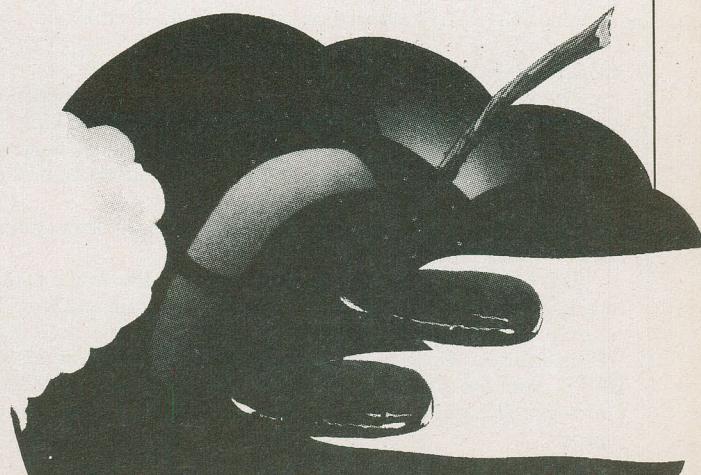
Having returned, the value that has been selected by the menu is returned in MENULN.

Watch the Spinning Cursor

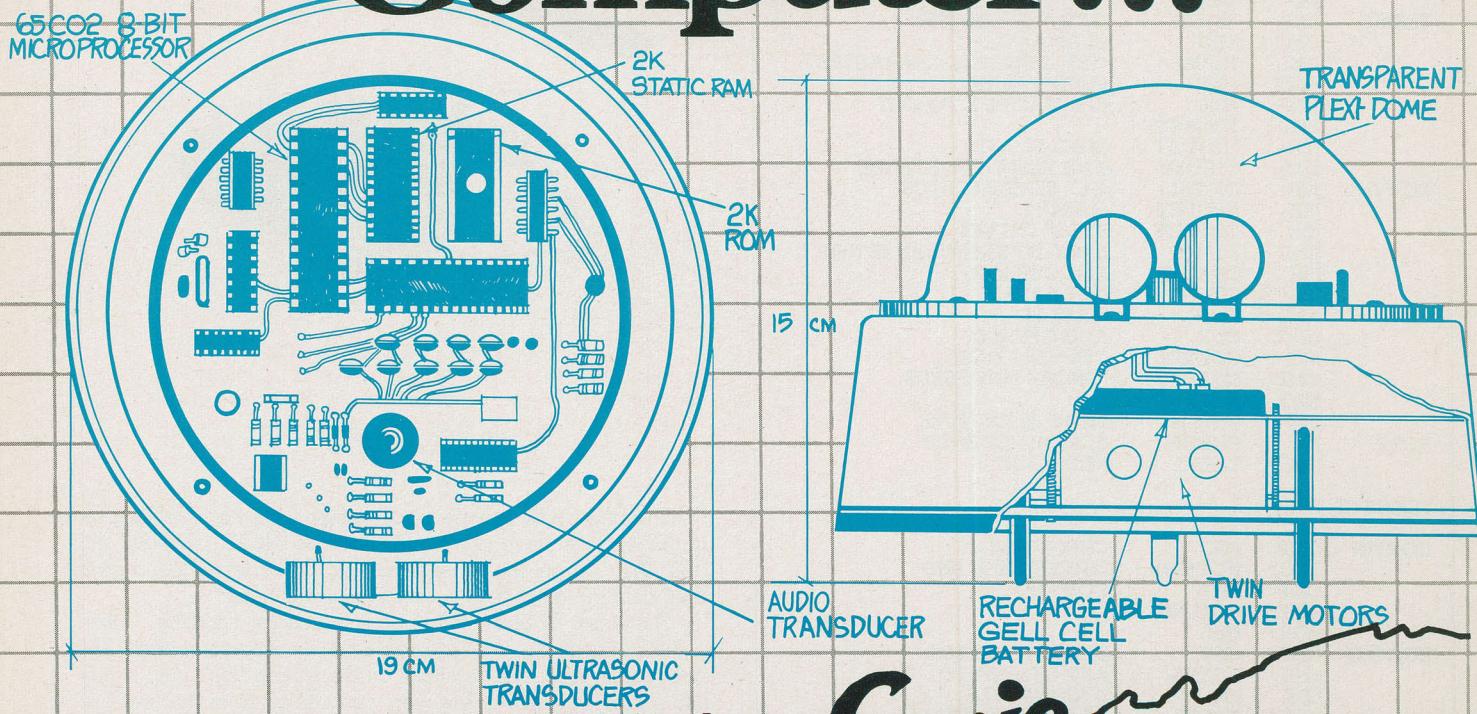
Finally, let's have a look at something that really looks strange on the tube. This is an example of a "live" cursor routine.

As you get into programming in assembly language you will find that in most cases you can create a fairly reasonable cursor by simply printing a flashing space at the appropriate spot on the screen. This is cool, of course, but the flashing space is really handled in hardware. It will usually keep flashing even if your program hangs like a heathen.

This is a communications terminal routine which uses a live cursor. It looks like a spinning bar. Aside from looking inutterably slick and being fun to watch as it goes spinning across the glass, it tells you that your program is still active.



Designed to meet your personal Computer...



...meet *Ernie*

One of the most unique computer peripherals available, Ernie will provide you with hours of entertainment while teaching you about the most significant technology to emerge from the computer revolution. **Robotics.**

Ernie sports a very impressive technical pedigree. Standard features include: Sonar obstacle detection, musical capabilities and variable speed, bidirectional drive motors. Ernie is fully programmable on your Apple, Radio Shack or Commodore personal computer. In fact, our optional "Ernie's Mother" control language is so simple and so much fun to use that we can't think of a better way to introduce young children to computer programming.

Ernie is constructed from the highest quality parts, and comes protected against defects in workmanship and materials for a full ninety days.

You and your friends will enjoy hour after hour of robotic entertainment. Order Ernie today by mailing the attached order form.

MICROHMEGA
Electronics
918 16 Ave. N.W., Calgary, Alberta, Canada T2M 0K3

Tele. (403) 289-6264

Circle No. 37 on Reader Service Card.

MICROHMEGA
Electronics

918 16 Ave. N.W., Calgary, Alberta Canada
T2M 0K3



MY COMPUTER WOULD LIKE TO MEET ERNIE.
I HAVE AN APPLE RADIO SHACK

COMMODORE 64

Please ship Ernie assembled and tested \$389.00
 Please ship the Ernie parts kit \$296.00

Please ship Ernie's Mother 5½ Floppy disk .. \$19.95
or Cassette \$15.95

NAME _____

ADDRESS _____

CITY _____ PROV. _____

POSTAL CODE _____ TELE. _____

Cheque VISA Master Charge

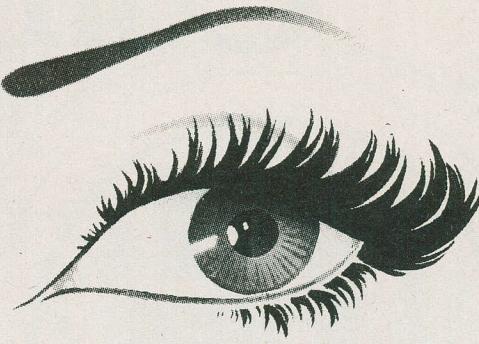
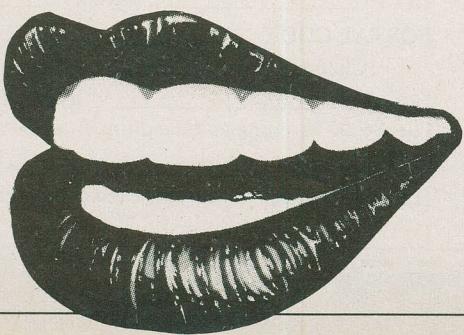
Card # _____ Expiry Date _____

(Plus \$6.00 shipping and handling.) (Allow 2-4 week delivery)

Please send me more information about Ernie and
"Ernie's Mother" for robotics and computer programming.

A Byte of Apple Assembly

TERM	JSR CLRSCRN	:CLEAR THE GLASS
	JSR SETINV	:SET INVERSE MODE
	JSR ILPRT	:AND SAY...
	ASC	TERMIN OF LINE - HIT CONTROL E TO EXIT'
	DFB CR.CR.0	
	JSR SETNORM	:UNDO INVERSE VIDEO
	JSR INDAT	:GOBBLE PORT GARBAGE
	JSR INDAT	
TERM1	JSR FETCH	:GET A CHARACTER
	CMP #\$80	:IF INVALID...
	BMI TERM2	:GET A REMOTE CHARACTER
	AND #\$7F	:MASK PARITY
	CMP #\$05	:SEE IF CTRL E TO EXIT
	BEQ TERMRITS	
	JSR OUTDAT	:SEND IT OUT
	LDA STROBE	:AND RESET THE STROBE
	JSR INCTRL	:GET SERIAL STATUS
	JSR ANDRCV	:MASK IT
	JSR CMPRCV	:SEE IF IT'S SET
	BNE TERM1	:BACK TO KEYBOARD IF NOT
	JSR CUROFF	:KILL CURSOR
	JSR INDAT	:GET DATA
	AND #\$7F	:MASK IT
	ADC #\$7F	:ADD OFFSET
	JSR CONVIN	:CONVERT CASE
	CMP #\$8A	:IGNORE LINE FEEDS
	BEQ NOLF	
	JSR PUTCH	:SHOW IT ON TUBE
	JSR CURON	:RESTART CURSOR
NOLF	JMP TERM1	:AND LOOP
TERMRITS	RTS	
CONVIN	CMP #\$E1	:CHECK FOR
	BCC NOCON1	:LOWER CASE AND
	CMP #\$FB	:CONVERT
	BCS NOCON1	
	EOR #\$20	
NOCON1	CMP #\$89	:CHECK FOR TABS
	BNE NOTAB	:AND EXPAND TO
	LDX #\$4	:FOUR SPACES
	JSR SPACE	:CHEAP AND NASTY)
NOTAB	RTS	
CURON	LDA CURSTH	:DO FAKE CURSOR
CURTBL	JMP SHOWIT	
	DFB	\$21, \$21, \$2F, \$2F, \$2D, \$2D,
		\$5C, \$5C
CCNT	DFB 0	
CIDX	DFB 0	
CURSTH	DFB 0	
FETCH	INC CCNT	:BUMP COUNT AND
	BNE NOCHNG	:IF IT CARRIER
	INC CIDX	:BUMP INDEX
	LDA CIDZ	:MASK LOWER THREE
	AND #\$07	:BYTE AND
	TAX	:POINT INTO TABLE
	LDA CURTBL,X	:GET CURSOR
	ADC #\$80	:ADD FUDGE FACTOR
	LDY HORIZON	:GET POINTER TO SCREEN
	STA (POINT), Y	:DO CURSOR
	STA CURSTH	:AND SAVE IT
	LDA KEYBRD	:GET KEYBOARD VALUE
NOCHNG	RTS	



This one is a bit strange too. To begin with, it's a skeletal program... you will have to write the routines INCTRL, INDAT and OUTDAT... to get the serial status, get the serial data and send serial data out respectively... for your serial card.

The weird bit about this code is the cursor handling. Unlike as in the case of, say, a Commodore 64, the Apple's screen RAM is not contiguous. The locations on the screen don't map neatly onto a block of RAM. However, you can point to the memory location the cursor is supposed to be in by doing

LDY HORIZON
STA (POINT), Y

In this case, we not only want to be able to place a character where the cursor is supposed to be... we want the little troll to keep changing. The bytes in CURTBL are characters which, when printed one after another, look like a spinning bar. Every time the terminal routine calls this code the counter is incremented and, when it overflows, CIDX gets bumped.

Each character is repeated twice in the table to slow down the apparent speed of the rotation. It looks slicker this way.

This thing can be lifted and used in quite a number of other applications, of course. You can even hook it into DOS to have it replace the DOS cursor if you want to.

Fruit Pies

While fairly limited as processor architectures go, the 6502 can be a lot of fun to tootle on. If you can get over its burning desire to keep everything in two hundred and fifty-six byte pages it can be almost manageable.

Many of the restrictions on 6502 programming, however, lurk in the heads of programmers. If you threaten it enough it can be made to do some pretty amazing things.

You'll never divorce it from the swamp dragon, though. As microprocessors go it's ancient, and it probably feels it has earned the right to be cantankerous.

CN!

COMPUTER PRESS

Industry Notes

COMPUTING NOW! — Numerous things happen in spring after a long winter's sleep, and the computer industry seems to be waking up from a small hibernation.

- **Commodore Business Machines** have announced two new micros... the Commodore 128 and a portable computer. The C128 is a low-profile machine with a number of surprises. The C128 has three modes: A C64 emulation mode, an expanded mode with extended BASIC commands and 119.5K available to BASIC programmers, and a CP/M mode. The computer has a 40 or 80 column

The XE line of computers is said to be 100 per cent compatible with the older 600XL and 800XL computers. The 65XE, with 64K of memory, replaces the 16K 600XL. Optionally, one might choose the 65XEP, a portable version of the 65XE with a built-in colour monitor and three and one-half inch disk drive. The 130XE replaces the 64K 800XL, and is laden with 128K of memory.

If the specifications of the new Ataris don't intrigue you, the projected prices (in American dollars) may: \$100.00 for the 65XE, \$400.00 for the 65XEP, \$200.00 for the 130XE, \$400.00 for the 130ST and \$600.00 for the 520ST.



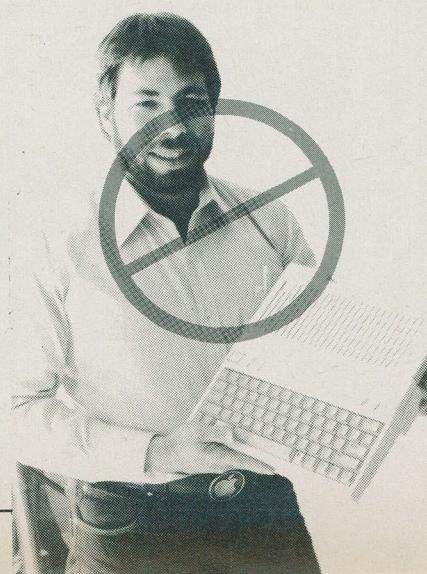
capability, an up to 640 by 200 pixels display, a machine language monitor and, with the new 1571 disk drives, can write more to a disk — faster — than a C64. The second entry... the portable computer... has an 80 by 16 LCD display, 32K of RAM, dedicated cursor keys, an integrated modem and integrated software.

Note that these products... at press time... haven't yet been shipped. Somewhere in this column is a photo of the Commodore MAX, which was announced alongside the C64, but didn't quite make it to dealer shelves.

- Recently announced... again, meaning not being shipped as of this issue's press time... computers from *Atari* may upset the accepted 'natural order' of things. Aside from the replacements to the 600XL and the 800XL computers... the 65XE and the 130XE computers, respectively... Atari has announced the ST line of microcomputers. These are neat. Using a 68000 microprocessor, the 130ST... with 128K RAM... or the 530ST... with 512K RAM... are expected to feature Digital Research's Mac lookalike GEM (an acronym for Graphics Environment Manager) as an operating system, three and one-half inch disk drives, a mouse, colour resolution up to 640 by 200 pixels, a built-in hard disk controller and more.

- News from *Apple Computer Incorporated* in Cupertino includes Steve Wozniak leaving the company... again. The Apple II Division crew disagreed with management's heavy emphasis on the Macintosh line, so the Woz split with a friend to work on a project involving video

continued on page 72



Next Month In Computing Now!

PC Special

The interest in the IBM PC... and in its legion of camp followers and hangers on... seems to remain unquenched, even as lesser systems with inferior promotional budgets fall to the vultures and chip gremlins. In the next edition of Computing Now! we'll be looking at another blue '75 Chevy pickup truck full of applications and features for the ubiquitous PC. Among the things we have in the works are:

Vector Interrupts: A look at how to manipulate the interrupt vector table in low memory and write resident interrupt handlers for the system. It sounds technical as hell, but, having gotten through it you'll be able to make your computer dance. None of this break dancing, either... it'll do Swan Lake on stilts.

Survey of Popular Slot Stuffers: There are about a quintillion things available to fit in the slots of a PC, and most of them are dull beyond any previous conception of the notion of dullness. A few, however, shine like lighthouses in January. We'll be checking out the brightest bulbs next time 'round.

Mass Backup Devices: Business users who begin to grok the ultimate volatility of spinning magnetic media often get a little paranoid over the thought of all sorts of irreplaceable data whirring about on their hard drives looking for dust. There is, however, an alternative approach to archiving your bytes. Next month we'll have a look at the details of high speed streamer tape backup.

A Better Morse Trap

Plug this thing into your Apple, dust off the short wave radio and you'll be able to check out data from the sky. Through the use of software which would have to come down several notches just to be brilliant this thing translates the dits and dahs into something not unlike English. It's fascinating wrinkle to telecommunications.

WordStar Printer Patcher

Word processors are all in the mind if you can't make them print anything. WordStar is a bit further into the cranial vacuum than most, as it has to be severely patched to make it worthy of most printers. Patching WordStar... in the normal course of existence... requires the use of a debugger, hexadecimal numbers and other low level nasties. In the next edition of Computing Now! we'll be having a shot at a much more user friendly patching program for this popular package.

All of these features are in an advanced state of preparation, but we reserve the right to change the final content of the issue. This disclaimer will self destruct in five seconds.

Survey of 200 Computers

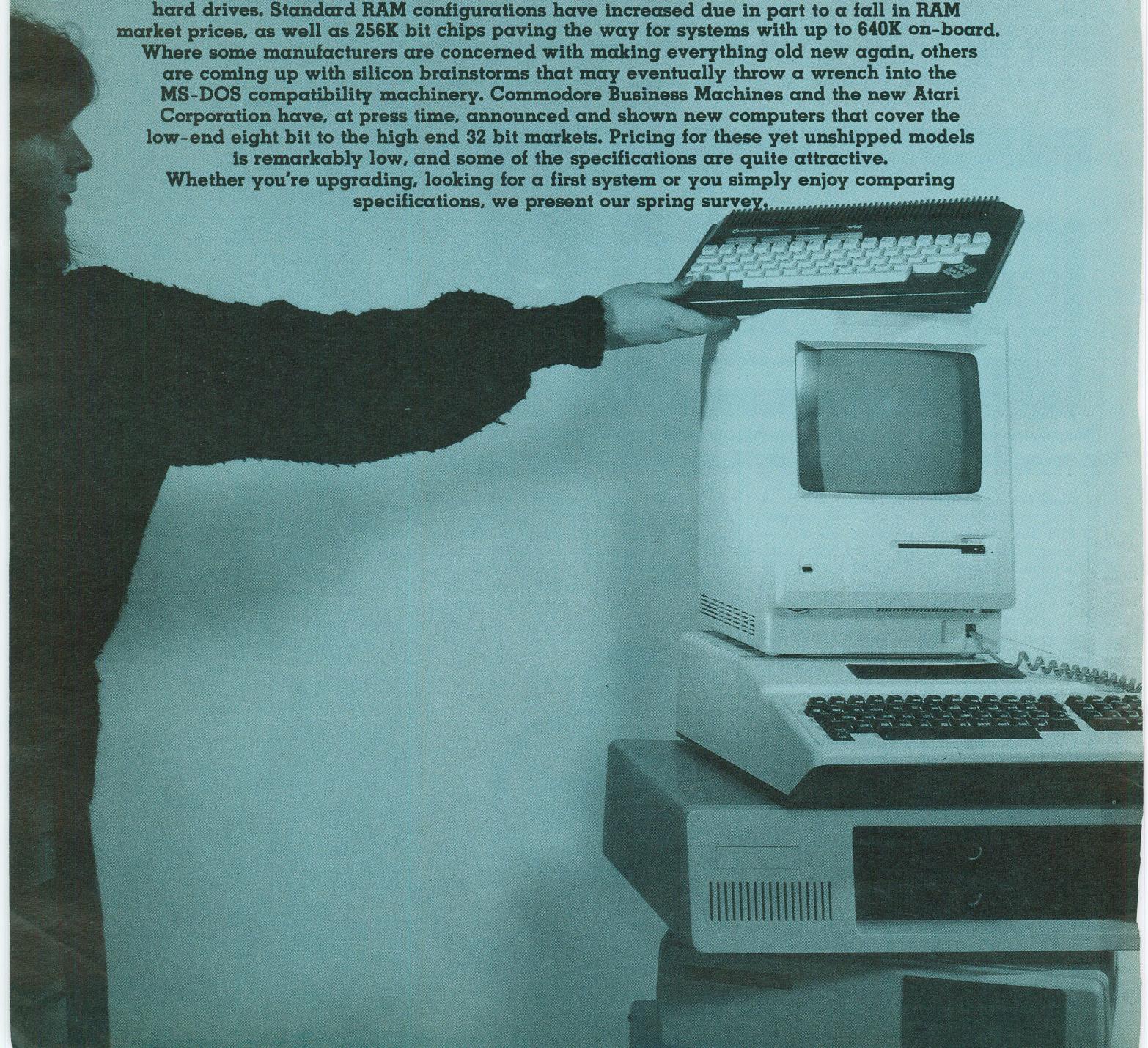
The more things change, the more they stay the same.

A standard run-in to a microcomputer marketplace that, besides witnessing the death of old systems and the birth of the new hasn't really been disrupted with anything violently different since we last had a good look at it six months ago in the September 1984 issue of CN!.

This is not to say there haven't been changes... prices, for the most part, have dropped dramatically even though the Canadian dollar has accompanied the fall. While the vast majority of new entries are predictably IBM PC compatibles and clones, this new breed has shaken some of the restrictions that were inherent in earlier models. Power supplies tend to be beefier, as most purchasers plan to upgrade their systems with power-hungry hard drives. Standard RAM configurations have increased due in part to a fall in RAM market prices, as well as 256K bit chips paving the way for systems with up to 640K on-board.

Where some manufacturers are concerned with making everything old new again, others are coming up with silicon brainstorms that may eventually throw a wrench into the MS-DOS compatibility machinery. Commodore Business Machines and the new Atari Corporation have, at press time, announced and shown new computers that cover the low-end eight bit to the high end 32 bit markets. Pricing for these yet unshipped models is remarkably low, and some of the specifications are quite attractive.

Whether you're upgrading, looking for a first system or you simply enjoy comparing specifications, we present our spring survey.





APC

Operating System: MS-DOS
Processor(s): 8086
RAM: 128K
Printer I/O: Serial and parallel
Disk Drives Inc: One or two 8" floppy
Screen Format: 80x25
Graphics: 640x480
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS, dBASE II, WordStar, more
Primary Market: Business
Manufacturer: NEC
Available From: Microcomputers of Canada
Suggested Retail: \$4195.00 1 drive with monochrome monitor

Aftek PC/PC+

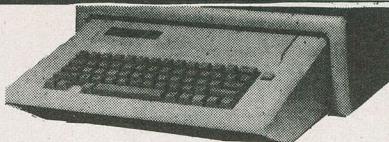
Operating System: MS-DOS
Processor(s): 8088
RAM: 128K
Printer I/O: One parallel
Disk Drives Inc: One 360K 5 1/4" floppy; PC+ has two
Screen Format: 80x25
Graphics: Optional card
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: Operating system
Primary Market: Business
Manufacturer: Aftek Business Machines, Inc.
Available From: Local dealers
Suggested Retail: \$1895.00 (PC); \$2103.00 (PC+)

Aftek XL/DL

Operating System: MS-DOS
Processor(s): 8088
RAM: 256K
Printer I/O: One parallel, one serial
Disk Drives Inc: One 360K 5 1/4" floppy, one 10Mb HD; DL has tape backup
Screen Format: 80x25
Graphics: Optional card
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: Operating system
Primary Market: Business
Manufacturer: Aftek Business Machines, Inc.
Available From: Local dealers
Suggested Retail: \$3523.00 (XL); \$4700.00 (DL)

Apple //c

Operating System: BASIC, ProDOS, DOS 3.3
Processor(s): 65C02
RAM: 128K
Printer I/O: Serial
Disk Drives Inc: One SSSD 5 1/4" floppy
Screen Format: 40/80x24
Graphics: 280/560x192 pixels
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: Four disk introduction, system utilities
Primary Market: Home
Manufacturer: Apple Computer
Available From: Local dealers
Suggested Retail: \$1795.00



Apple //e

Operating System: BASIC; DOS optional
Processor(s): 6502A
RAM: 64K; 128K optional
Printer I/O: Optional serial or parallel
Disk Drives Inc: Optional
Screen Format: 40x24; Optional 80x24
Graphics: 280/560x192 pixels
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: BASIC; ProDOS with drive purchase
Primary Market: Business and home
Manufacturer: Apple Computer Incorporated
Available From: Local dealers
Suggested Retail: \$1395.00



Apple Macintosh

Operating System: Macintosh Operating System
Processor(s): 68000
RAM: 128K or 512K
Printer I/O: Serial
Disk Drives Inc: One 3 1/2" drive standard
Screen Format: Variable
Graphics: 512x342 pixels
Sound: Yes
Colour: No
Keyboard: Detachable
Software Included: Graphics and word processing
Primary Market: Home, business, educational
Manufacturer: Apple Computer Corp.
Available From: Apple Canada
Suggested Retail: \$3295.00; 512K version retails for \$4095.00

Apple Macintosh XL

Operating System: Integrated icon software
Processor(s): 68000
RAM: 512K
Printer I/O: 2 serial, 1 parallel
Disk Drives Inc: One 3 1/2" floppy, one 10 mb hard disk
Screen Format: Variable
Graphics: 720x360 pixels
Sound: Yes
Colour: No
Keyboard: Detachable
Software Included: N/A
Primary Market: Business
Manufacturer: Apple Computer
Available From: Local Dealers
Suggested Retail: \$6595.00

Apricot F1

Operating System: MS-DOS
Processor(s): 8086
RAM: 256K
Printer I/O: One serial, one parallel
Disk Drives Inc: One 720K 3 1/2" floppy
Screen Format: 40/80x25
Graphics: 640x256
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: Operating systems, Personal BASIC, Dr. LOGO, more
Primary Market: Home
Manufacturer: Applied Computer Techniques, Britain
Available From: Western Cash Register
Suggested Retail: \$2755 (includes 800x400 monochrome monitor)

Apricot PC

Operating System: MS-DOS, CP/M 86, Concurrent CP/M 8086; 8089 (I/O)
Processor(s): 256K
RAM: One parallel, one serial
Disk Drives Inc: Two 315K 3 1/2" floppy, or two 720K 3 1/2" floppy
Screen Format: 80x25
Graphics: 800x400
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: Operating systems, BASICs, Super-Writer, Calc, more
Primary Market: Business
Manufacturer: Applied Computer Techniques, Britain
Available From: Western Cash Register
Suggested Retail: \$3250.00 (315K drives); \$3620.00 (720K drives)

Apricot Portable

Operating System: MS-DOS
Processor(s): 8086 (5 MHz)
RAM: 256K; 128K colour RAM
Printer I/O: One serial, one parallel
Disk Drives Inc: One 720K 3 1/2" floppy
Screen Format: 40/80x25 LCD; optional RGB monitor
Graphics: 640x200 pixels
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: Operating system, voice recognition, more
Primary Market: Business, home
Manufacturer: Applied Computer Techniques, Britain
Available From: Western Cash Register
Suggested Retail: \$3995.00

Apricot Xi

Operating System: MS-DOS, CP/M 86, Concurrent CP/M 8086; 8089 (I/O)
Processor(s): 256K
RAM: One parallel, one serial
Disk Drives Inc: One 720K 3 1/2" floppy and one 10Mb HD
Screen Format: 80x25
Graphics: 800x400
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: Same as Apricot PC
Primary Market: Business
Manufacturer: Applied Computer Techniques, Britain
Available From: Western Cash Register
Suggested Retail: \$6045.00 (includes 800x400 monochrome monitor)

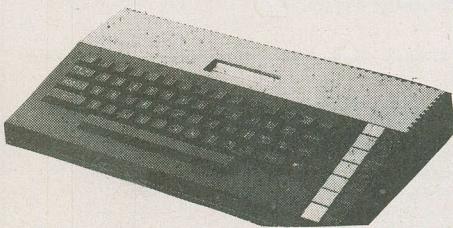


Associate

Operating System: CP/M or MS-DOS, CP/M-86
Processor(s): Z80A or optional 8088
RAM: 128K
Printer I/O: 3 serial, one IEEE, optional parallel
Disk Drives Inc: Two 360K 5 1/4" floppy
Screen Format: 80/132x25
Graphics: 32 characters
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: Microplan, Spellbinder, acc pak
Primary Market: Business
Manufacturer: Associate
Available From: Datacal Technology
Suggested Retail: \$4495.00

Associate +/+10

Operating System: CPM; MS-DOS or CP/M-86 optional
Processor(s): Z80A; 8088 optional
RAM: 128K
Printer I/O: Three serial, one IEEE, optional parallel
Disk Drives Inc: Two 760K 5 1/4" floppy; +10 model has one floppy with 10 Mb HD
Screen Format: 80x135x25
Graphics: 32 characters in ROM
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: MicroPlan, Spellbinder, acc pak
Primary Market: Business
Manufacturer: Associate
Available From: Datacal Technology
Suggested Retail: \$5495.00 (+); \$7495.00 (+10)



Atari 600XL

Operating System: BASIC
Processor(s): 6502
RAM: 16K
Printer I/O: Parallel
Disk Drives Inc: Optional disk drive or recorder
Screen Format: 40x24
Graphics: 320x192 pixels
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: BASIC
Primary Market: Home
Manufacturer: Atari
Available From: Local dealers
Suggested Retail: \$99.99

Atari 800 XL

Operating System: BASIC
Processor(s): 6502
RAM: 64K
Printer I/O: Serial
Disk Drives Inc: Optional
Screen Format: 40x24
Graphics: 280x192 pixels
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: BASIC
Primary Market: Home or Business
Manufacturer: Atari
Available From: Local dealers
Suggested Retail: \$199.99

BBC Micro

Operating System: Proprietary
Processor(s): 6502 (Optional Z80B or second 6502)
RAM: 32K
Printer I/O: One serial, one parallel
Disk Drives Inc: Optional
Screen Format: 20/40/80x25
Graphics: 320/640 x 200
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: Word Processor, BASIC, Music, Speech
Primary Market: Educational, home
Manufacturer: Acorn Computers Corporation
Available From: Acorn Computers Corporation
Suggested Retail: \$1295.00

BEST Mark II

Operating System: MS-DOS or CP/M-86 optional
Processor(s): 8088
RAM: 256K or 512K
Printer I/O: Serial and parallel
Disk Drives Inc: Two DD DS floppy
Screen Format: 80x24
Graphics: 640x200 pixels
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: Phoenix BIOS
Primary Market: Business
Manufacturer: Multiflex
Available From: Exceltronix
Suggested Retail: \$1759.00; 512K Mark II is \$1949.00

Bondwell 12/14

Operating System: CPM 3.0
Processor(s): Z80
RAM: 64K; 128K (Bondwell 14)
Printer I/O: N/A
Disk Drives Inc: Two 360K 5 1/4" floppy
Screen Format: 80x25
Graphics: 160x75
Sound: Yes
Colour: No
Keyboard: Detachable
Software Included: WordStar, CalcStar, MailMerge, DataStar, more
Primary Market: Business
Manufacturer: Bondwell Computer
Available From: Spectravideo Canada
Suggested Retail: \$1995.00; \$2695.00 (Bondwell 14)



CBM 8296

Operating System: CBM BASIC 4.0
Processor(s): 6502
RAM: 96K
Printer I/O: IEEE-488, eight-bit user bus
Disk Drives Inc: Optional single or dual 5 1/4" floppy
Screen Format: 80x25
Graphics: N/A
Sound: No
Colour: No
Keyboard: Detachable
Software Included: BASIC, Execu-Desk
Primary Market: Business
Manufacturer: Commodore Business Machines
Available From: Local dealers
Suggested Retail: \$1695.00

Canon AS-100

Operating System: CP/M or DOS
Processor(s): 8088
RAM: 128K
Printer I/O: Optional serial or parallel
Disk Drives Inc: Optional 5 1/4" or 8" floppy or 5" hard
Screen Format: 80x25
Graphics: 640x400 pixels
Sound: No
Colour: Optional
Keyboard: Detachable
Software Included: 2 BASICs
Primary Market: Business
Manufacturer: Canon
Available From: Office Equipment
Suggested Retail: \$3525.00



Chameleon Plus

Operating System: DOS 1.25 or CP/M 80
Processor(s): Z80 and 8088
RAM: 256K; expandable to 640K
Printer I/O: Serial and parallel
Disk Drives Inc: Two DS DD 5 1/4" floppy
Screen Format: 40/80x25
Graphics: 320/640x200 pixels
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: WordStar, SuperCalc 3, Condor I, much more
Primary Market: Business
Manufacturer: Sequa
Available From: Golden Maple Leaf
Suggested Retail: \$3495.00; Other configurations available

Coleco Adam

Operating System: SmartBASIC
Processor(s): Z80A
RAM: 80K
Printer I/O: Daisywheel printer included
Disk Drives Inc: Digital cassette (50 ips.)
Screen Format: 36x25
Graphics: N/A
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: SmartWriter, SmartBASIC, game
Primary Market: Home or business
Manufacturer: Coleco
Available From: Local dealers
Suggested Retail: \$499.00

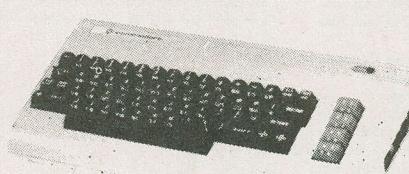
Columbia NPC 1600-1

Operating System: CP/M-86 and MS-DOS
Processor(s): 8088
RAM: 128K
Printer I/O: Two serial, one parallel
Disk Drives Inc: Dual 5 1/4" floppy
Screen Format: 40/80x24
Graphics: 320/640x200 pixels
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: Two operating systems, Perfect software
Primary Market: Business
Manufacturer: Columbia Data Systems
Available From: Peripherals Plus
Suggested Retail: \$3399.00



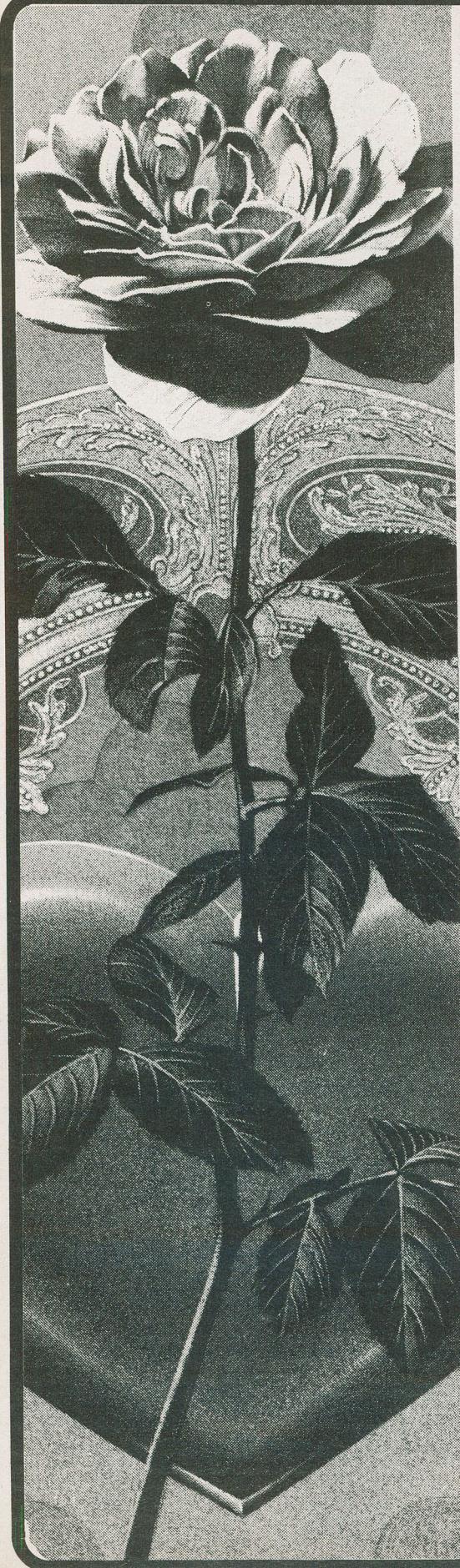
Columbia VP

Operating System: CP/M 86, MS-DOS
Processor(s): 8088
RAM: 128K
Printer I/O: Serial, parallel and seven exp. slots
Disk Drives Inc: Two half-height 5 1/4" DS DD
Screen Format: 40/80x25
Graphics: 640x200 pixels
Sound: Yes
Colour: No
Keyboard: Detachable
Software Included: Perfect series, Fast Graphics
Primary Market: Business
Manufacturer: Columbia Data Systems
Available From: Peripherals Plus
Suggested Retail: \$2999.00



Commodore 64

Operating System: BASIC
Processor(s): 6510
RAM: 64K
Printer I/O: Serial
Disk Drives Inc: Optional 5 1/4" drive
Screen Format: 40x25
Graphics: 320x200 pixels
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: BASIC
Primary Market: Home
Manufacturer: Commodore
Available From: Local retailers
Suggested Retail: \$249.95



Almost Free Software for the IBM PC Volume 3

Without software even the slickest computer is nothing for more than a foot stool for dwarfs. With the high cost and general funkiness of commercial software being what it is you may be a bit loath to go pop for the expensive stuff. We can relate to this.

No one with any measurable amount of sense enjoys buying a pig in a poke for six hundred dollars knowing full well that its previous owner may not have been able to successfully identify which was the pig.

Almost Free software does away with a lot of the bad vibes inherent in buying software. It offers a rich variety of applications, it's devoid of copy protection and licensing agreements and it's so cheap that if even one of its applications proves useful to you it's well worth the twenty bucks.

This disk consists of some of the finest stuff we could find. We sorted through about four megabytes of software to compile it and, even if you were to allow for the countless hours it would take you to find it all and two keyboards with their control, alternate and delete keys worn clear through, it would cost you more than twenty bills in disks to duplicate.

Included on the disk are:

FIKWS. WordStar, the ethereal Martian of word processors, has a propensity of leaving odd bits set in its files. This makes them look remarkably like high tech confetti if you type them or otherwise try to stick 'em in other applications. This program effectively turns them back into ASCII.

WRT. DOS 2.0 allows for each file to have a read only flag . . . although it lacks a way of manipulating them. This pair of utilities allows you to set and unset this flag, protecting important files from accidental erasure.

BROWSE. If you type a text file chances are that the part you want to see will scroll past you before you have a chance to see it, and you'll have to type it several times as a result. BROWSE allows you to scroll in both directions, much as you might if you were using a word processor.

CAT. If the DIR display is too dull for your tastes you obviously need CAT, which will tell you everything you could possibly want to know about the files on your disks.

CGCLOCK This is a simple little program which displays the running time in the upper right hand corner of your screen. However, it has lots of display options and works with the colour graphics card.

CURSOR. This program makes the cursor big. It's pointless, but it's only twenty four bytes long.

CMP. This program does a very elaborate comparison of two files and reports their differences. It can for example, spot corrupted files, and has a multitude of uses when dealing with files created by redirection.

JUMPJOE. A bit like Miner 2049'er, this game is certain to damage your mind. You get to be the janitor of a space station. Deal with berserk robots and other weirdnesses. It's a hoot.

CASTLE. This is unquestionably the best public domain we've ever come across . . . when we got it productive work stopped here for about two days. Wander around a deserted castle collecting treasures . . . but mind you don't get killed by the nasties. A solution is included should frustration set in.

78INT. This is a small BASIC program to calculate interest using the rule of seventy eight.

MOON. One of the nicest lunar lander games we've come across, this little beast uses high resolution colour graphics and decent sound effects to hurl you to your doom in style.

PERCHT. This is another serious BASIC program, this time to print Pert charts.

DATNOIDS. As games go, this one is highly strange. In fact, mere words don't serve to describe it . . . you'll have to try it for yourself.

NUKE-NY. This is one of the nastiest bits of software we've ever seen. It produces a full colour high resolution simulation of a nuclear attack on New York city. It's just the thing to give to paranoid people you don't like very much.

NUDE. Yes, it's a bit exploitative and probably in questionable taste, but it's just so well done. This program uses high resolution graphics to draw this chick with great . . . huge . . . pixels.

Also included on the disk is an extensive READ ME file which contains documentation for the programs. The third volume of Almost Free PC Software is available on a double sided disk in your choice of ten attractive colours . . . all of which are black . . . for a mere

\$19.95*

Almost Free PC Software #3

Moorshead Publications

25 Overlea Boulevard, Suite 601

Toronto, Ontario M4H 1B1

If you just can't wait for the mail . . . nobody lives forever . . . we'll be happy to take your order by phone at 1-416-423-3262 during business hours. Have your Mastercard, VISA or American Express card ready.

*This software is also available on two single sided disks for \$24.95

Fine Print: all of the software on the Almost Free PC Software disk volume three has been obtained from public access bulletin boards, and is believed to be in the public domain. Some of it is "freeware", and contains requests for contributions to its authors. This is between you and your conscience . . . hit RETURN and they usually go away.

The cost of this package defers our cost in collecting, patching and handling this software, plus the cost of the disk and postage.

We have worked extremely hard to ensure that the programs on this disk will work properly on all PC compatibles. However, it's possible that your system may not be entirely compatible with those of the authors of these programs.

Moorshead Publications warrants that this software will be readable when you get it. If it is not, we will replace your disk. While we have made every effort to ensure that these programs will run properly, we are unable to assist you in adapting them for your applications.

Commodore 16

Operating System: BASIC
Processor(s): 8501
RAM: 16K
Printer I/O: Serial
Disk Drives Inc: Optional 5 1/4" SSSD floppy
Screen Format: 40x25
Graphics: 320x192 pixels
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: BASIC
Primary Market: Home
Manufacturer: Commodore
Available From: Local retailers
Suggested Retail: \$149.95



Commodore 4032

Operating System: BASIC
Processor(s): 6502
RAM: 32K
Printer I/O: IEEE, parallel
Disk Drives Inc: Optional
Screen Format: 40x24
Graphics: 128 characters in ROM
Sound: No
Colour: No
Keyboard: Integrated
Software Included: BASIC
Primary Market: Education
Manufacturer: Commodore Business Machines
Available From: Local dealers
Suggested Retail: \$1095.00



Commodore +4

Operating System: PET BASIC
Processor(s): 8501
RAM: 64K
Printer I/O: Serial
Disk Drives Inc: Optional 5 1/4" SSSD floppy
Screen Format: 40x25
Graphics: 320x192 pixels
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: BASIC, word processor, spreadsheet, file
Primary Market: Home
Manufacturer: Commodore
Available From: Local retailers
Suggested Retail: \$399.95

Commodore Executive 64

Operating System: PET BASIC
Processor(s): 6510
RAM: 64K
Printer I/O: Serial and IEEE
Disk Drives Inc: One 5 1/4" drive
Screen Format: 40x25
Graphics: 320x200 pixels
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: BASIC
Primary Market: Business
Manufacturer: Commodore
Available From: Local dealers
Suggested Retail: \$1499.95

Commodore SuperPET

Operating System: microBASIC
Processor(s): 6502 & 6809
RAM: 96K
Printer I/O: Serial and IEEE
Disk Drives Inc: Optional
Screen Format: 80x25
Graphics: 128 characters
Sound: No
Colour: No
Keyboard: Integrated
Software Included: Waterloo APL/BASIC/COBOL/FORTRAN/PASCAL
Primary Market: Education
Manufacturer: Commodore
Available From: Local dealers
Suggested Retail: \$1695.00

Compaq Deskpro Model 1

Operating System: MS-DOS
Processor(s): 8086
RAM: 128K
Printer I/O: One parallel
Disk Drives Inc: One 360K 5 1/4" floppy
Screen Format: 40/80x25
Graphics: 320/640x200
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS
Primary Market: Business
Manufacturer: Compaq Computer Corporation
Available From: Micro-Lewis
Suggested Retail: \$3360.00

Compaq Deskpro Model 2

Operating System: MS-DOS
Processor(s): 8086
RAM: 256K
Printer I/O: One parallel
Disk Drives Inc: Two 360K 5 1/4" floppy
Screen Format: 40/80x25
Graphics: 320/640x200
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS
Primary Market: Business
Manufacturer: Compaq Computer Corporation
Available From: Micro-Lewis
Suggested Retail: \$4110.00



Compaq Deskpro Model 3

Operating System: MS-DOS
Processor(s): 8086
RAM: 256K
Printer I/O: One parallel, one asynch. communications
Disk Drives Inc: One 360K 5 1/4" floppy, one 10Mb HD
Screen Format: 40/80x25
Graphics: 320/640x200
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS
Primary Market: Business
Manufacturer: Compaq Computer Corporation
Available From: Micro-Lewis
Suggested Retail: \$7110.00

Compaq Deskpro Model 4

Operating System: MS-DOS
Processor(s): 8086
RAM: 640K
Printer I/O: One parallel, one asynch. communications
Disk Drives Inc: One 360K 5 1/4" floppy, one 10Mb HD, one 10Mb backup
Screen Format: 40/80x25
Graphics: 320/640x200
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS
Primary Market: Business
Manufacturer: Compaq Computer Corporation
Available From: Micro-Lewis
Suggested Retail: \$10410.00

Compaq Plus

Operating System: MS-DOS
Processor(s): 8088
RAM: 256K
Printer I/O: One parallel
Disk Drives Inc: One 5 1/4" 360K floppy, one 10Mb HD
Screen Format: 40/80x25
Graphics: 320/640x200
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS, Microsoft BASIC
Primary Market: Business
Manufacturer: Compaq Computer Corporation
Available From: Micro-Lewis
Suggested Retail: \$7495.00



Limited time offer

SSDD - \$15.00/box

DSDD - \$20.00/box

(Minimum purchase - 5 Delivery extra.)



Programmers Guild Products Ltd., 255 ManuLife Place, 10180 - 101 St.,
Edmonton, Alberta T5J 3S4 Phone: (403) 428-6229



Switch

to the highest
quality, lowest
priced brand name
diskettes available
in Canada.

Q. Who has switched?

A. Professional and educational institutions, national accounting firms, major engineering firms, software houses and computer retailers.

We're up to our ears
in diskettes!

\$100*
EACH

Take advantage of this special volume purchase
and load up your drives with the lowest priced
diskettes in Canada.

*Minimum purchase - 100. Delivery extra.



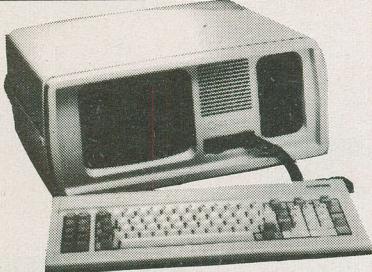
Marketed by: Programmers Guild Products Ltd.
255 ManuLife Place, 10180 - 101 St.,
Edmonton, Alberta Phone: (403) 428-6229

Compaq Portable

Operating System: MS-DOS
Processor(s): 8088
RAM: 256K
Printer I/O: One parallel
Disk Drives Inc: One or two 5 1/4" 360K floppy
Screen Format: 40/80x24
Graphics: 320/640x200
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS, Microsoft BASIC
Primary Market: Business
Manufacturer: Compaq Computer Corporation
Available From: Micro-Lewis
Suggested Retail: \$3745.00 (one drive); \$4495.00 (two drives)

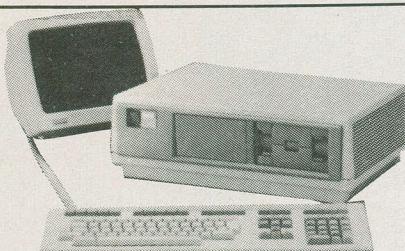
Corona PC

Operating System: MS-DOS
Processor(s): 8088
RAM: 256K
Printer I/O: Serial and parallel
Disk Drives Inc: Two DSDP floppy
Screen Format: 80x24
Graphics: 640x325 pixels
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: Multimate 3.26, MS-DOS 2.0
Primary Market: Business
Manufacturer: Corona
Available From: Scarsdale Computers
Suggested Retail: \$3990.00; hard disk version \$5995.00



Corona Portable

Operating System: MS-DOS
Processor(s): 8088
RAM: 256K
Printer I/O: Serial and parallel; four exp. slots
Disk Drives Inc: Two DD DD floppy
Screen Format: 80x24
Graphics: 640x325 pixels
Sound: Yes
Colour: No
Keyboard: Detachable
Software Included: MS-DOS 2.0, Multimate 3.26
Primary Market: Business
Manufacturer: Corona
Available From: Scarsdale
Suggested Retail: \$3990.00



DEC Decmate II

Operating System: Proprietary DOS
Processor(s): 12 bit 6120
RAM: 96K
Printer I/O: Serial
Disk Drives Inc: Two 5 1/4" floppy
Screen Format: 80/132x24
Graphics: N/A
Sound: No
Colour: Optional
Keyboard: Detachable
Software Included: WPS, CP/M
Primary Market: Business
Manufacturer: Digital Equipment
Available From: Local Dealers
Suggested Retail: \$3956.00

DEC Decmate III

Operating System: Proprietary DOS
Processor(s): 12 bit 6120
RAM: 96K
Printer I/O: Serial
Disk Drives Inc: Two 400K 5 1/4" floppy
Screen Format: 80/132x24
Graphics: N/A
Sound: No
Colour: Optional
Keyboard: Detachable
Software Included: Word processor, CP/M
Primary Market: Business
Manufacturer: Digital Equipment
Available From: Local dealers
Suggested Retail: \$3985.00

DEC Rainbow 100

Operating System: CP/M-86 or MS-DOS
Processor(s): Z80 and 8088
RAM: 128K
Printer I/O: Serial
Disk Drives Inc: One drive accommodating two 5 1/4" disks
Screen Format: 80/132x24
Graphics: Optional; 800x240 pixels
Sound: No
Colour: Optional
Keyboard: Detachable
Software Included: Choice of CP/M-86 or MS-DOS
Primary Market: Business
Manufacturer: Digital Equipment
Available From: Local Dealers
Suggested Retail: \$3572.00

DEC Rainbow 100+

Operating System: CP/M-86/80 or MS-DOS
Processor(s): Z80 and 8088
RAM: 128K
Printer I/O: Serial
Disk Drives Inc: One dual-diskette drive, one 10 Mb HD
Screen Format: 80/132x24
Graphics: Optional; 800x240 pixels
Sound: No
Colour: Optional
Keyboard: Detachable
Software Included: Choice of CP/M-86 or MS-DOS
Primary Market: Business
Manufacturer: Digital Equipment
Available From: Local dealers
Suggested Retail: \$6380.00

Direct IPC-FM

Operating System: MS-DOS
Processor(s): 8088
RAM: 256K
Printer I/O: Two serial, one parallel
Disk Drives Inc: Two 360K 5 1/4" floppy
Screen Format: 40/80x25
Graphics: 320/640x200
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS 2.0, GWBASIC
Primary Market: Business
Manufacturer: Direct Incorporated
Available From: Datamax
Suggested Retail: 4240.00 including monitor

Data General /One

Operating System: MS-DOS or CP/M 86
Processor(s): 80C88
RAM: 128K
Printer I/O: Two serial
Disk Drives Inc: One 720K 3 1/2" floppy; optional 3 1/2" or 5 1/4" floppy
Screen Format: 80x25
Graphics: 640x256
Sound: Yes
Colour: No
Keyboard: Integrated
Software Included: BIOS in ROM, built-in programs, MS-DOS
Primary Market: Business
Manufacturer: Nippon Data General
Available From: Data General (Canada) Inc.
Suggested Retail: \$4462.00

Data-2000

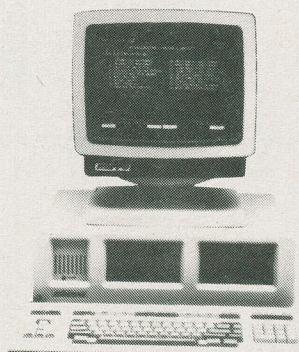
Operating System: Proprietary
Processor(s): Proprietary 4-bit CPU
RAM: 2K CMOS
Printer I/O: N/A
Disk Drives Inc: N/A
Screen Format: 10x4
Graphics: 10 graphics characters in ROM
Sound: Yes
Colour: No
Keyboard: Separate from watch
Software Included: N/A
Primary Market: Business, students
Manufacturer: Hattori-Seiko Company Ltd.
Available From: SC Time Canada
Suggested Retail: \$200.00 with keyboard and batteries

Datapoint Vista PC

Operating System: MS-DOS
Processor(s): 80186
RAM: 256K
Printer I/O: Two serial, one parallel
Disk Drives Inc: Two 640K 5 1/4" floppy or one 640K floppy with 10 Mb HD
Screen Format: 80x25
Graphics: 720x348
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: CTOS, MS-DOS, GWBASIC
Primary Market: Business
Manufacturer: Convergent Technologies
Available From: Datapoint Corporation
Suggested Retail: \$6795.00 (with colour monitor); \$10560.00 (HD model)

Durango Poppy

Operating System: MS-DOS, Concurrent CP/M
Processor(s): 80186; optional 80286
RAM: 128K
Printer I/O: Two serial, one parallel
Disk Drives Inc: One 819K floppy, one 10 Mb HD
Screen Format: 80x25
Graphics: No
Sound: Yes
Colour: No
Keyboard: Detachable
Software Included: MS-DOS
Primary Market: Business
Manufacturer: Molecular Computer
Available From: Norango Computer Systems Inc.
Suggested Retail: \$7500.00



Durango Poppy II

Operating System: XENIX, MS-DOS, Concurrent CP/M, CP/M-86, OS/5, DX85M
Processor(s): 80186 and 80286
RAM: 640K
Printer I/O: Two serial, one parallel
Disk Drives Inc: One 819K floppy, one 20 Mb HD (optional 40 Mb HD)
Screen Format: 80x25
Graphics: No
Sound: Yes
Colour: No
Keyboard: Detachable
Software Included: XENIX
Primary Market: Business
Manufacturer: Molecular Computer
Available From: Norango Computer Systems Inc.
Suggested Retail: \$15,300.00

ALL THE BEST PRICES

HOME COMPUTERS

IBM



AST RESEARCH

Six Pak Plus.....from	\$399.00
Combo Plus II.....from	\$449.00
Mega Plus.....from	\$439.00
I/O Plus.....from	\$219.00

HERCULES

Graphics Card.....	\$525.00
Color Card.....	\$319.00

QUADRAM

Quadlink 64K.....	\$729.00
Quadboard II.....as low as.....	\$469.00
Quad 512 Plus.....as low as.....	\$396.00
Quadcolor I.....	\$219.00
Chronograph.....	\$139.00
Parallel Interface Board.....	\$139.00
64K RAM Chip Kits.....	\$ 49.00

PARADISE

Multi-Display Card.....	\$449.00
Modular Graphics Card.....	\$499.00
TANDON DISK DRIVES	
TN100-2.5-1/4" 320K.....	\$239.00



Call for new low pricing

850 Interface.....	\$179.00
1010 Recorder.....	\$ 65.00
1020 Color Printer.....	\$ 89.00
1025 Dot Matrix Printer.....	\$299.00
1027 Letter Quality Printer.....	\$429.00
1030 Direct Connect Modem.....	\$116.00
1050 Disk Drive.....	\$275.00
64K Memory Module (600).....	\$149.00
CX 30 Paddles.....	\$ 18.00
CX 40 Joystick.....	\$ 12.00



Call for CBM 4 plus

SX-64 Portable.....	\$899.00
Commodore 64.....	\$295.00
C1541 Disk Drive.....	\$35.00
C1530 Data Set.....	\$ 69.00
C1520 Color Printer/Plotters.....	\$212.00
MPS801 Dot Matrix Printer.....	\$299.00
MPS802 Dot Matrix Printer.....	\$399.00
C1702 Color Monitor.....	\$349.00
Joystick.....	\$ 7.99
C1660....300 Baud Modem.....	\$149.99
Paddles.....	\$ 18.99
Simons Basic.....	\$ 33.00
MCS801 Color Printer.....	\$749.00
DPS1101 Daisy Printer.....	\$735.00
Magic Voice Speech Module.....	\$ 85.00
Desk Organizer w/Lock.....	\$ 69.00
VIDTEX Telecommunications.....	\$ 32.99

MSD DISK DRIVES

MSD1....Single Disk Drive.....	\$429.00
MSD2....Double Disk Drive.....	\$749.00

ASHTON-TATE

Framework.....	\$569.00
dBASE II.....upgrade.....	\$195.00
dBASE II.....	\$275.00
dBASE III.....	\$599.00
Friday.....	\$279.00

CONTINENTAL SOFTWARE

1st Class Mail/Form Letter.....	\$105.00
Home Accountant Plus.....	\$125.00

IUS

EasyWriter II.....	\$299.00
Easy Speller.....	\$165.00
Easy Filer.....	\$376.00

LOTUS

Symphony.....	\$719.00
Lotus 123.....	\$429.00

MAI

MAI.....	CALL
----------	------

MICROMIM

R:Base 4000.....	\$379.00
------------------	----------

MICROPRO

Wordstar Professional Pack.....	\$498.00
---------------------------------	----------

MICROSOFT

Multiplan.....	\$204.00
----------------	----------

MICROSTUFF

Crosstalk XVI.....	\$155.00
--------------------	----------

MULTIMATE INT.

Multimate.....	\$155.00
----------------	----------

SPI

Open Access.....	\$549.00
------------------	----------

VISICORP

Visicalc IV.....	\$299.00
VisiWord +.....	\$359.00
Optical Mouse.....	\$279.00

ATARI



CALL WHILE SUPPLIES LAST 600XL, 800XL, 1200XL

7097 Atari Logo.....	\$110.00
4018 Pilot (Home).....	\$ 85.00
8036 Atari Writer.....	\$ 73.00
5049 Visicalc.....	\$118.00
488 Communicator II.....	\$179.00

SWP

ATR8000-16K Z80 CP/M.....	\$590.00
ATR8000-64K Z80 CP/M.....	\$795.00

BIT 3

Full View 80.....	\$349.00
-------------------	----------

ATARI DRIVES

Indus GT.....	\$559.00
Rana 1000.....	\$429.00

KOALA

Koala Pad w/Micro Painter.....	\$ 99.00
--------------------------------	----------

PERSONAL PERIPHERAL

Super Sketch Graphics Pad.....	\$ 61.99
APPLE IIe/IIc/Mac.....	CALL

APPLE

APPLE IIe/IIc/Mac.....	CALL
------------------------	------

APPLE/FRANKLIN

DISK DRIVES	
-------------	--

MICRO SCI

A2.....	\$295.00
A20.....	SCALL

RANA

Elite 1.....	\$411.00
Elite 2.....	\$569.00
Elite 3.....	\$829.00

BATTERIES INCLUDED

Paper Clip w/Spell Pack.....	\$ 89.95
The Consultant DBMS.....	\$ 99.95
Bus Card II.....	\$159.99
80 Col Display.....	\$159.99

AXIOM

AT-100 Atari Inter Printer.....	\$295.00
AT-550 Atari Bidirectional.....	\$469.00
AT-700 Atari Color Printer.....	\$699.00
GP-100 Parallel Interface.....	\$277.00
GP-550 Parallel Printer.....	\$395.00

BMC

401 Letter Quality.....	\$899.00
BX-80 Dot Matrix.....	\$395.00

C. ITOH

Gorilla Banana.....	\$219.00
Prowriter 8510P.....	\$498.00
Prowriter 1550P.....	\$879.00
A10 Son of Starwriter 18cps.....	\$849.00
Hot Dot Matrix.....	CALL

COMREX

ComWriter II Letter Qual.....	\$649.00
-------------------------------	----------

DAISYWRITER

2000.....	\$1,449.00
-----------	------------

DIABLO

620 Letter Quality.....	\$1,449.00
630 Letter Quality.....	\$2,675.00

EPSON

RX-80, RX-80FT, RX-100.....	CALL
LQ1500.....	\$1,695.00
JX-80, FX-80, FX-100.....	CALL

IDS

Prism 80.....for config.....	CALL
Prism 32.....for config.....	CALL
6100.....	\$649.00

JUKI

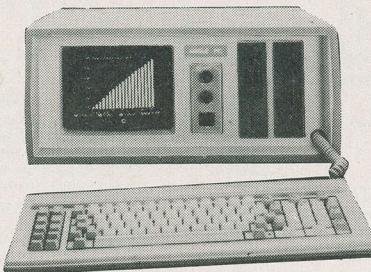
6300.....	\$1,249.00
-----------	------------

MODEMS

Voksmodem.....	\$ 99.00
</tr

ECS1-PC

Operating System: MS-DOS
Processor(s): 8088
RAM: 64K
Printer I/O: Optional serial or parallel
Disk Drives Inc: One 360K 5 1/4" floppy
Screen Format: 40/80x25
Graphics: 320/640x200
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: N/A
Primary Market: Business
Manufacturer: N/A
Available From: Electronic Control Systems
Suggested Retail: \$1295.00



ECS4 System

Operating System: BASIC, DOS 3.3
Processor(s): 6502, Z80
RAM: 64K
Printer I/O: Optional parallel or serial
Disk Drives Inc: One 143K 5 1/4" floppy
Screen Format: 40x24
Graphics: 280x192
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: BASIC in ROM
Primary Market: Business, home
Manufacturer: N/A
Available From: Electronic Control Systems
Suggested Retail: \$995.00

ECS6 Portable

Operating System: BASIC, DOS 3.3 or CP/M
Processor(s): 6502, Z80
RAM: 64K
Printer I/O: Optional parallel or serial
Disk Drives Inc: One 143K 5 1/4" floppy
Screen Format: 40x24 (9" amber monitor)
Graphics: 280x192
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: BASIC in ROM
Primary Market: Business, home
Manufacturer: N/A
Available From: Electronic Control Systems
Suggested Retail: \$1195.00

Eagle PC +I/PC +II

Operating System: MS-DOS 2.1, CP/M-86, GWBASIC
Processor(s): 8088
RAM: 256K (up to 640K on-board)
Printer I/O: Two serial, one parallel
Disk Drives Inc: One 5 1/4" floppy; PC +II has two
Screen Format: 40/80x25
Graphics: Optional card... 640x200 pixels
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: MS-DOS, BASICA
Primary Market: Business
Manufacturer: Eagle Computers
Available From: DataTech Systems Ltd., Leading Source
Suggested Retail: \$2875.00 (PC +I), \$3180.00 (PC +II)

Eagle PC +XL

Operating System: MS-DOS, CP/M 86, GWBASIC
Processor(s): 8088
RAM: 256K (up to 640K on-board)
Printer I/O: Two serial, one parallel
Disk Drives Inc: One 5 1/4" floppy, one 10mb HD
Screen Format: 40/80x25
Graphics: Optional 640x200
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: MS-DOS, BASIC
Primary Market: Business
Manufacturer: Eagle Computers
Available From: DataTech Systems Ltd., Leading Source
Suggested Retail: \$5020.00

Eagle Spirit II

Operating System: MS-DOS, CP/M-86, GWBASIC
Processor(s): 8088
RAM: 256K (up to 640K on-board)
Printer I/O: Two serial, one parallel
Disk Drives Inc: Two 5 1/4" floppy
Screen Format: 40/80x25
Graphics: 640x200 pixels
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS 2.1, BASICA
Primary Market: Business
Manufacturer: Eagle Computers
Available From: DataTech Systems Ltd., Leading Source
Suggested Retail: \$3335.00

Eagle Spirit XL

Operating System: MS-DOS, CP/M 86, GWBASIC
Processor(s): 8088
RAM: 256K (up to 640K on-board)
Printer I/O: Two serial, one parallel
Disk Drives Inc: Two 5 1/4" floppy, one 10 Mb HD
Screen Format: 40/80x25
Graphics: 640x200
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS 2.1, BASICA
Primary Market: Business
Manufacturer: Eagle Computers
Available From: DataTech Systems Ltd., Leading Source
Suggested Retail: \$5170.00

Eagle Turbo GT

Operating System: MS-DOS
Processor(s): 8086 (8 MHz-4.77 MHz switchable)
RAM: 512K
Printer I/O: One parallel
Disk Drives Inc: One 5 1/4" floppy, one 32 Mb HD
Screen Format: 80x25
Graphics: 640x200 (optional)
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: BASICA, MS-DOS
Primary Market: Business
Manufacturer: Eagle Computer
Available From: Datatech Systems Limited
Suggested Retail: \$8540.00

Eagle Turbo XL

Operating System: MS-DOS
Processor(s): 8086 (8 MHz-4.77 MHz switchable)
RAM: 256K
Printer I/O: One parallel
Disk Drives Inc: One 5 1/4" floppy, one 10 Mb hard
Screen Format: 40/80x25
Graphics: Optional... 640x200 pixels
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: BASICA, MS-DOS
Primary Market: Business
Manufacturer: Eagle Computer
Available From: Datatech Systems Ltd., Leading Source
Suggested Retail: \$5475.00

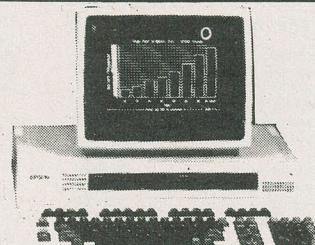
Epson Geneva

Operating System: CP/M 2.2
Processor(s): Z80
RAM: 64K
Printer I/O: Thermal printer port
Disk Drives Inc: Cassette, optional 3 1/2" floppy
Screen Format: 80x8 LCD
Graphics: Yes
Sound: Yes
Colour: No
Keyboard: Integrated
Software Included: Portable WordStar, spreadsheet, scheduler
Primary Market: Business
Manufacturer: Epson
Available From: Epson Canada
Suggested Retail: \$1499.00



Epson HX 20

Operating System: BASIC
Processor(s): 6301
RAM: 16K
Printer I/O: Serial and parallel
Disk Drives Inc: Micro cassette
Screen Format: 20x4 LCD
Graphics: 120x32 pixels
Sound: Yes
Colour: No
Keyboard: Integrated
Software Included: SkiWriter
Primary Market: Business
Manufacturer: Epson
Available From: Epson Canada
Suggested Retail: \$1099.00



Epson QX-10

Operating System: Valdocs
Processor(s): Z80A
RAM: 256K
Printer I/O: Serial and parallel
Disk Drives Inc: Two DS DD 5 1/4" floppy
Screen Format: 80x25
Graphics: 640x400 pixels
Sound: No
Colour: No
Keyboard: Detachable
Software Included: Indexer, word processor, mail system, more
Primary Market: Business
Manufacturer: Epson
Available From: Epson Capada
Suggested Retail: \$2995.00

Ericsson PC

Operating System: MS-DOS
Processor(s): 8088
RAM: 256K
Printer I/O: One serial, one parallel
Disk Drives Inc: Two 360K 5 1/4" floppy
Screen Format: 80x25
Graphics: 640x400 monochrome
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: MS-DOS, GWBASIC, Diagnostics, tutorial
Primary Market: Business
Manufacturer: Ericsson Communications Inc.
Available From: Local dealers
Suggested Retail: \$4800.00 including amber monitor



Executive BEST Mark II

Operating System: MS-DOS, CP/M 86 (optional)
Processor(s): 8088
RAM: 512K
Printer I/O: One serial, one parallel
Disk Drives Inc: One 360K 5 1/4" floppy, one 20 Mb HD
Screen Format: 40/80x25
Graphics: 320/640x200
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: Phoenix BIOS in ROM
Primary Market: Business
Manufacturer: Multiflex
Available From: Exceltronix
Suggested Retail: \$3395.00

Expander

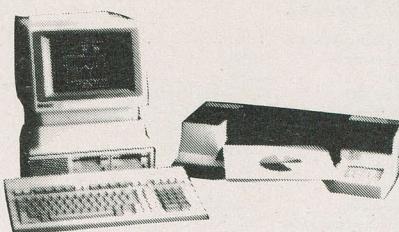
Operating System: CP/M
Processor(s): Z80A
RAM: 64K
Printer I/O: Serial and parallel
Disk Drives Inc: 5 1/4" or 8" floppy
Screen Format: 80x24
Graphics: 80x72 pixels with colour
Sound: Yes
Colour: Yes; 256 c
Keyboard: Integrated
Software Included: CP/M
Primary Market: Business
Manufacturer: California Computer Systems
Available From: Orion Electronic Supplies
Suggested Retail: \$1000.00

GRiD Compass

Operating System: GRiD-OS
Processor(s): 8086 and 8087
RAM: 256K RAM, 384K bubble memory
Printer I/O: IEEE, two serial; 1200/300 baud modem
Disk Drives Inc: Optional floppy or hard disks
Screen Format: Up to 80x24
Graphics: 320x240 pixels
Sound: Yes
Colour: No
Keyboard: Integrated
Software Included: GRiDPlan/Write/Print/Plot/File
Primary Market: Business
Manufacturer: GRiD Systems Corporation
Available From: Local dealers
Suggested Retail: \$6295.00

Genesys

Operating System: MS-DOS, PC-DOS
Processor(s): 8088
RAM:
Printer I/O: One parallel
Disk Drives Inc:
Screen Format: 40/80x25
Graphics: 320/640x200
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: BIOS in ROM
Primary Market: Business
Manufacturer: Computech Micro Design
Available From: Computech Micro Design
Suggested Retail: \$1995.00 (base price)

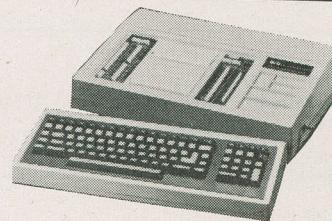


HP 150 Touchscreen

Operating System: MS-DOS, HP Touch
Processor(s): 8088
RAM: 256K
Printer I/O: Two serial, one IEEE-488
Disk Drives Inc: Twin 710K 3 1/2" drives or single with 15Mb HD
Screen Format: 80x24
Graphics: 512x390 pixels
Sound: No
Colour: No
Keyboard: Detachable
Software Included: MS-DOS, P.A.M.
Primary Market: Business
Manufacturer: Hewlett Packard
Available From: Local HP dealers
Suggested Retail: \$6043.00; 15 Mb HD model is \$9507.00

HS-161

Operating System: MS-DOS
Processor(s): 8088
RAM: 128K
Printer I/O: Two serial, one parallel
Disk Drives Inc: One or two 5 1/4" floppy
Screen Format: 80x25
Graphics: 640x200
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS, diagnostic software
Primary Market: Business, hobbyist
Manufacturer: Heathkit/Zenith
Available From: Heathkit/Zenith
Suggested Retail: \$2599.00 (one drive), \$2999.00 (two)

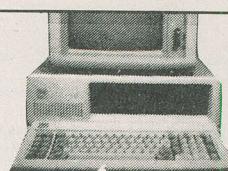


Heath ET-100

Operating System: Assembler, editor and debugger
Processor(s): 8088
RAM: 16K
Printer I/O: One serial, one programmable parallel
Disk Drives Inc: Cassette based; disk upgrade available
Screen Format: 40x20 or 80x24
Graphics: 33 graphic characters
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: CP/M assembler, editor and debugger
Primary Market: Hobbyist and education
Manufacturer: Heathkit
Available From: Heathkit
Suggested Retail: Kit - \$1499.95

Heath H-101

Operating System: Choice
Processor(s): 8088 and 8085
RAM: 192K
Printer I/O: Two serial and one parallel
Disk Drives Inc: One DS DD 5 1/4" floppy
Screen Format: 80x24
Graphics: 640x225 pixels
Sound: No
Colour: Optional
Keyboard: Integrated
Software Included: CP/M or ZDOS
Primary Market: Business
Manufacturer: Heathkit
Available From: Heathkit
Suggested Retail: \$2999.00; \$3199.00 with integrated monitor



HP Series 200 Model 16

Operating System: BASIC
Processor(s): 68000
RAM: 512K
Printer I/O: Serial and IEEE
Disk Drives Inc: Dual 720K 3 1/2" floppy
Screen Format: 80x25
Graphics: 300x400 pixels
Sound: No
Colour: No
Keyboard: Detachable
Software Included: BASIC
Primary Market: Business
Manufacturer: Hewlett Packard
Available From: Local HP dealers
Suggested Retail: \$9075.00

HS-151

Operating System: MS-DOS
Processor(s): 8088
RAM: 128K
Printer I/O: Two serial, one parallel, IBM compatible slots
Disk Drives Inc: One or two 5 1/4" DS DD floppy
Screen Format: 80x25
Graphics: 640x200 pixels
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS, diagnostic software
Primary Market: Business/hobbyist
Manufacturer: Heath/Zenith
Available From: Heathkit Electronics Centre
Suggested Retail: Kits: \$2399.00 (one drive), \$2799.00 (two)

IBM PC

Operating System: PC DOS, UCSD p-System and CP/M-86
Processor(s): 8088
RAM: 256K
Printer I/O: Expansion slots
Disk Drives Inc: One or two 360K 5 1/4" floppy
Screen Format: 80x25
Graphics: 640x200 pixels
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: Operating systems
Primary Market: Business
Manufacturer: International Business Machines
Available From: Local dealers
Suggested Retail: \$3069.00; \$3725.00 (two drives)

IBM PC/AT

Operating System: MS-DOS
Processor(s): 8086
RAM: 256K, 512K enhanced version
Printer I/O: One serial, one parallel (enhanced)
Disk Drives Inc: One 1.2Mb floppy; same, with 20Mb HD (enhanced)
Screen Format: 40/80x25
Graphics: 320/640x200
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: Software in ROM
Primary Market: Business
Manufacturer: International Business Machines Corp.
Available From: Local IBM dealers
Suggested Retail: \$6149.00; \$8195.00 enhanced

IBM PC/XT

Operating System: PC-DOS, UCSD p-System, CP/M-86
Processor(s): 8088
RAM: 256K
Printer I/O: Expansion slots
Disk Drives Inc: One 5 1/4" floppy, one 10 Mb hard drive
Screen Format: 80x25
Graphics: 640x200 pixels
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: Operating systems
Primary Market: Business
Manufacturer: International Business Machines
Available From: Local Dealers
Suggested Retail: \$6760.00



IBM PCjr

Operating System: DOS 2.1 (enhanced model), Cassette BASIC
Processor(s): 8088
RAM: 64K; 128K enhanced
Printer I/O: Serial
Disk Drives Inc: Optional floppy; One 320K floppy (enhanced)
Screen Format: 40/80x24
Graphics: 320/640x200
Sound: Yes
Colour: Yes
Keyboard: Detached
Software Included: BASIC; DOS 2.1 (enhanced model)
Primary Market: Home
Manufacturer: International Business Machines
Available From: Local Dealers
Suggested Retail: \$998.00; \$1569.00 enhanced

IBM Portable

Operating System: MS-DOS, PC-DOS
Processor(s): 8088
RAM: 256K
Printer I/O: Five expansion slots
Disk Drives Inc: One or two 5 1/4" DS DD floppy
Screen Format: 40/80x25
Graphics: 650x200 pixels
Sound: Yes
Colour: No
Keyboard: Detachable
Software Included: Operating systems
Primary Market: Business
Manufacturer: International Business Machines
Available From: Local dealers
Suggested Retail: \$3995.00 (one drive); \$4649.00 (two)

ISM Express

Operating System: MS-DOS
Processor(s): 8088
RAM: 128K
Printer I/O: Two serial, two parallel
Disk Drives Inc: Two 360K 5 1/4" floppy
Screen Format: 40/80/132x25
Graphics: 320/640x200
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS, GWBASIC
Primary Market: Business
Manufacturer: ISM Integrated Systems Marketing
Available From: Norango Computer Systems Inc.
Suggested Retail: \$4200.00 (includes 9" colour monitor)

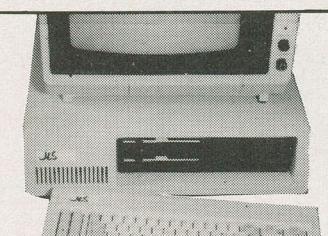
ITT Xtra

Operating System: ITT DOS 2.11
Processor(s): 8088
RAM: 128K or 256K
Printer I/O: N/A
Disk Drives Inc: One 360K 5 1/4" floppy
Screen Format: 80x25
Graphics: N/A
Sound: Yes
Colour: N/A
Keyboard: Detachable
Software Included: N/A
Primary Market: Business
Manufacturer: ITT Corporation
Available From: ComputerLand
Suggested Retail: N/A



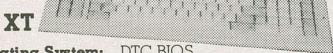
Infinity 8800

Operating System: BASIC
Processor(s): 6502 and Z80
RAM: 48K or 64K
Printer I/O: Optional serial or parallel
Disk Drives Inc: Optional slim-line 5 1/4" floppy
Screen Format: 40x24
Graphics: 280x192 pixels
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: BASIC
Primary Market: Business/home
Manufacturer: Infinite Canada Inc.
Available From: Infinite Canada Inc.
Suggested Retail: \$529.00; \$569.00 (64K)



JLS XT

Operating System: DTC BIOS
Processor(s): 8088
RAM: 64K
Printer I/O: Eight slots
Disk Drives Inc: N/A
Screen Format: 80x24
Graphics: N/A
Sound: Yes
Colour: N/A
Keyboard: Detachable
Software Included: BIOS in ROM
Primary Market: Business
Manufacturer: JLS Electronics
Available From: JLS Electronics
Suggested Retail: \$1499.00



Kaypro 10

Operating System: CP/M
Processor(s): Z80A
RAM: 64K
Printer I/O: Two serial, one parallel
Disk Drives Inc: One 5 1/4" floppy, one 10 mb HD
Screen Format: 80x24
Graphics: 160x100
Sound: No
Colour: No
Keyboard: Detachable
Software Included: CP/M, WordStar, Word Plus, Microplan, more
Primary Market: Business
Manufacturer: Kaypro
Available From: Computron
Suggested Retail: \$4095.00; \$4695.00 with Juki printer and software

Kaypro 16

Operating System: MS-DOS
Processor(s): 8088
RAM: 256K
Printer I/O: One serial, one parallel
Disk Drives Inc: One 5 1/4" 360K floppy, one 10Mb HD
Screen Format: 80x25
Graphics: N/A
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MITE, WordStar, InfoStar +, MS-DOS, GWBASIC, more
Primary Market: Business
Manufacturer: Kaypro
Available From: Computron
Suggested Retail: \$5195.00

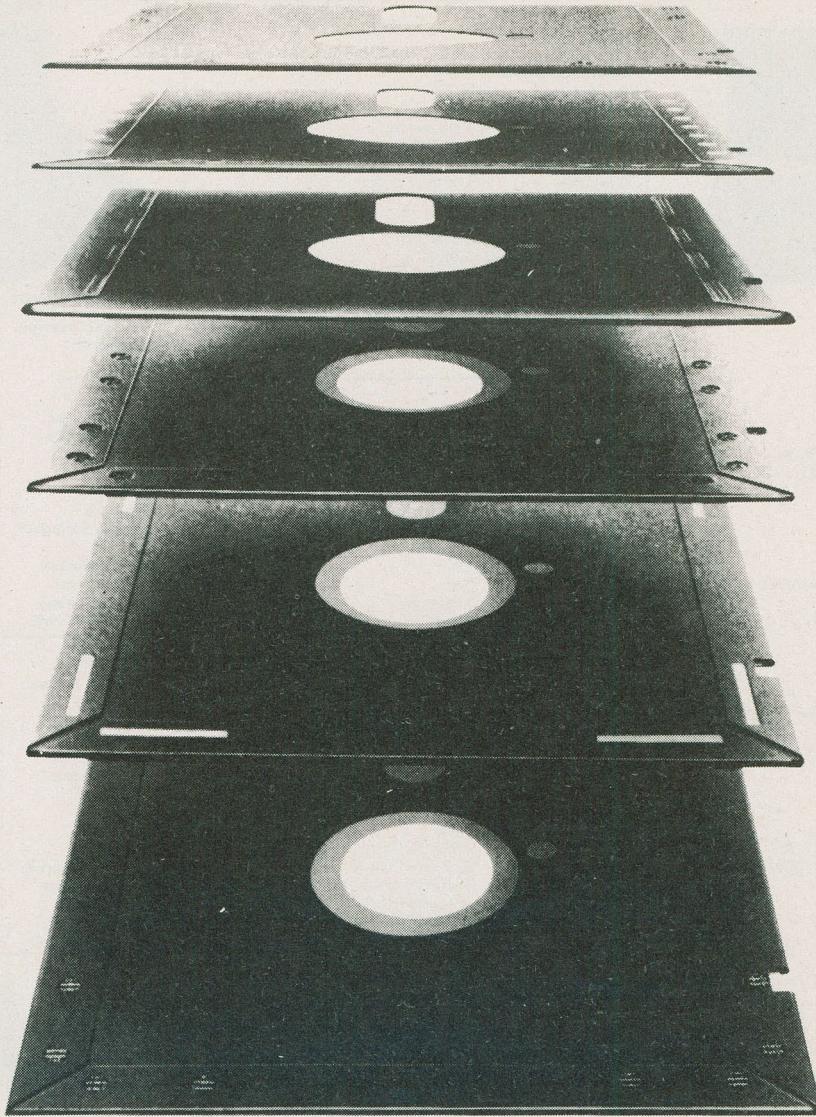


Kaypro II

Operating System: CP/M
Processor(s): Z80A
RAM: 64K
Printer I/O: Two serial and parallel
Disk Drives Inc: One 390K 5 1/4" floppy
Screen Format: 80x24
Graphics: No
Sound: No
Colour: No
Keyboard: Detachable
Software Included: MBASIC, WordStar
Primary Market: Business
Manufacturer: Kaypro
Available From: Computron
Suggested Retail: \$1695.00; \$2395.00 with Juki printer and Type-It

Kaypro IIX

Operating System: CP/M
Processor(s): Z80A
RAM: 64K
Printer I/O: Two serial, one parallel
Disk Drives Inc: Two 5 1/4" 390K floppy
Screen Format: 80x24
Graphics: N/A
Sound: No
Colour: No
Keyboard: Detachable
Software Included: As with Kaypro II, but much more
Primary Market: Business
Manufacturer: Kaypro
Available From: Computron
Suggested Retail: \$2395.00; \$3095.00 with Juki printer and software



Our competition is as bad as its seams.

The other guys just can't get it together. Their seams, that is.

All these floppy disk makers seal their edges just here and there. Leaving most of each edge unsealed. And unprotected.

That's not just unseemly.

That's dangerous. Because a sloppy floppy can snag on the drive head of your computer, and lose the data that took you hours—or days—to enter.

There is, however, an un-sloppy alternative.

Memorex® flex disks.

We seal every inch of every edge with Solid Seam Bonding. A special process we developed to help Memorex disks resist puckering, bulging and warping. Resist all the things that can jam your disk drive and lose your data.

Why make a disk this good? Because inside is a storage media so good that we certify it to be 100% error free.

The choice is yours. You can be safe and secure with Memorex. Or you can come apart at the seams.

For more information on the full line of Memorex quality computer media products, including computer tape, call toll-free:
1-800-268-9896

MEMOREX CANADA

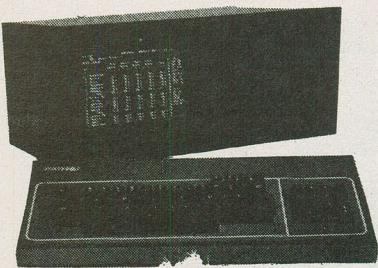
A Division of Burroughs
Memorex Inc.
7050 WOODBINE AVENUE,
MARKHAM, ONTARIO
L3R 4G8



Memorex is a registered trademark of Memorex Corporation. Memorex has the edge is a trademark of Memorex Corporation ©1984 Memorex Corporation.

Circle No. 22 on Reader Service Card

Dealer Inquiries Invited



Kaypro IIx (replaces 4)

Operating System: CP/M
Processor(s): Z80A
RAM: 64K
Printer I/O: Two serial and parallel
Disk Drives Inc: Two 5 1/4" DS DD
Screen Format: 80x24
Graphics: No
Sound: No
Colour: No
Keyboard: Detachable
Software Included: CP/M 2.2, M/C/SBASIC, WordStar, Word Plus, more
Primary Market: Business
Manufacturer: Multitech Ind. Corp.
Available From: Tithes Business Systems (Canada) Inc.
Suggested Retail: \$2895.00

Kaypro IIx Plus 88

Operating System: CP/M, MS-DOS
Processor(s): Z80A, 8088
RAM: 320K
Printer I/O: One parallel, two serial
Disk Drives Inc: Two 360K 5 1/4" floppy
Screen Format: 80x24
Graphics: Optional
Sound: No
Colour: No
Keyboard: Detachable
Software Included: Same as Kaypro II
Primary Market: Business
Manufacturer: Kaypro
Available From: Computron
Suggested Retail: \$3595.00

Loaded BEST Mark II

Operating System: MS-DOS, CP/M 86 (optional)
Processor(s): 8088
RAM: 256K (Super Loaded has 512K)
Printer I/O: One serial, one parallel
Disk Drives Inc: One 360K 5 1/4" floppy, one 10 Mb HD
Screen Format: 40/80x25
Graphics: 320/640x200
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: Phoenix BIOS in ROM
Primary Market: Business
Manufacturer: Multiflex
Available From: Exceltronix
Suggested Retail: \$2695.00; Super Loaded \$2895.00

MPF I

Operating System: N/A
Processor(s): Z80
RAM: 2K
Printer I/O: One parallel, breadboard
Disk Drives Inc: Cassette driven
Screen Format: 6x1 LED
Graphics: N/A
Sound: N/A
Colour: N/A
Keyboard: Integrated
Software Included: N/A
Primary Market: Schools, engineering
Manufacturer: MultiTech
Available From: Tithes Business Systems (Canada) Inc.
Suggested Retail: \$225.00

MPF II

Operating System: BASIC
Processor(s): 6502
RAM: 64K
Printer I/O: One parallel
Disk Drives Inc: Optional
Screen Format: 40x24
Graphics: 280x192 pixels
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: BASIC
Primary Market: Business
Manufacturer: Multitech Ind. Corp.
Available From: Tithes Business Systems (Canada) Inc.
Suggested Retail: \$179.00 including keyboard, CPU and power

MPF III

Operating System: BASIC
Processor(s): 6502, Z80
RAM: 64K
Printer I/O: One parallel
Disk Drives Inc: One 5 1/4" floppy
Screen Format: 40/80x24
Graphics: 280x192 pixels
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: BASIC
Primary Market: Business or home
Manufacturer: Multitech
Available From: Tithes Business Systems (Canada) Inc.
Suggested Retail: \$1250.00 (including monochrome monitor)

MPF-PC, PC/XT

Operating System: MS-DOS, Concurrent CP/M-86
Processor(s): 8088
RAM: 256K, PC/XT has 384K
Printer I/O: One serial, one parallel
Disk Drives Inc: Two 360K 5 1/4" floppy; PC/XT has one, and 10 Mb HD
Screen Format: 320/640x200
Graphics: 50 graphics characters
Sound: No
Colour: No
Keyboard: Purchased separately
Software Included: CP/M
Primary Market: Hobbyist
Manufacturer: Multiflex
Available From: Exceltronix
Suggested Retail: \$1195.00; \$995.00 kit

Memotech MTX 512

Operating System: BASIC
Processor(s): Z80A and TI9928A (graphics)
RAM: 64K
Printer I/O: Two parallel; optional twin serial
Disk Drives Inc: Cassette based; optional single or twin 5 1/4" floppy
Screen Format: 32/40x24
Graphics: 256x192
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: BASIC, Noddy, Graphics, Assembler, Front Panel
Primary Market: Home
Manufacturer: Memotech Limited, Britain
Available From: Electronic Distributors Inc.
Suggested Retail: \$945.00 (base system)

Morrow Micro Decision MD3

Operating System: CP/M 2.2
Processor(s): Z80
RAM: 64K
Printer I/O: Two serial
Disk Drives Inc: 720K floppy disk
Screen Format: 80x24
Graphics: N/A
Sound: Yes
Colour: No
Keyboard: Detachable
Software Included: Word processor, speller, spreadsheet, more
Primary Market: Business
Manufacturer: Morrow
Available From: SGV
Suggested Retail: \$2995.00



Morrow Pivot

Operating System: MS-DOS
Processor(s): 80C86
RAM: 256K
Printer I/O: One parallel, one serial, one RJ11C (phone)
Disk Drives Inc: Two 360K 5 1/4" floppy
Screen Format: 80x16 LCD
Graphics: Yes
Sound: Yes
Colour: No
Keyboard: Integrated
Software Included: MS-DOS, New Word, telecom program in ROM
Primary Market: Business
Manufacturer: Morrow
Available From: SGV
Suggested Retail: \$4340.00

Multiflex

Operating System: CP/M
Processor(s): Z80A
RAM: 64K
Printer I/O: One parallel, 2 optional serial
Disk Drives Inc: One 5 1/4" floppy
Screen Format: 80x24
Graphics: 50 graphics characters
Sound: No
Colour: No
Keyboard: Purchased separately
Software Included: CP/M
Primary Market: Hobbyist
Manufacturer: Multiflex
Available From: Exceltronix
Suggested Retail: \$1195.00; \$995.00 kit



NCR PC Computer

Operating System: CP/M
Processor(s): Z80
RAM: 64K
Printer I/O: Serial and parallel
Disk Drives Inc: Two floppy or one floppy, one hard
Screen Format: 80x24
Graphics: 640x400 pixels
Sound: No
Colour: Optional
Keyboard: Detachable
Software Included: BASIC, financial and word processor
Primary Market: Business
Manufacturer: NCR
Available From: SGV Marketing
Suggested Retail: \$3895.00 (0102); \$6895.00 (0103); \$4495.00

NEC PC 8801

Operating System: BASIC
Processor(s): PD780C-1; Z80 compatible
RAM: 64K
Printer I/O: Parallel and serial
Disk Drives Inc: 5 1/4" or 8" floppy
Screen Format: 80x25
Graphics: 640x200 pixels
Sound: No
Colour: Optional
Keyboard: Detachable
Software Included: Two BASICs, WordStar, CP/M, more
Primary Market: Business
Manufacturer: NEC
Available From: Microcomputers of Canada
Suggested Retail: \$1995.00, \$2495.00 (5 1/4" drive, monitor); \$3195.00 (8" drive)



NEC PC-8201

Operating System: Proprietary
Processor(s): 80C85
RAM: 16K
Printer I/O: Parallel
Disk Drives Inc: No
Screen Format: 40x8 LCD
Graphics: Block
Sound: Yes
Colour: No
Keyboard: Integrated
Software Included: Textfiles, Telecom
Primary Market: Business
Manufacturer: NEC
Available From: Microcomputers of Canada
Suggested Retail: \$499.95



Nelma Persona

Operating System: CP/M
Processor(s): Z80A
RAM: 64K
Printer I/O: Two serial and one parallel
Disk Drives Inc: Two 5 1/4" floppy
Screen Format: 80x24
Graphics: Optional
Sound: No
Colour: No
Keyboard: Detachable
Software Included: WordStar, CalcStar, comm. software
Primary Market: Business
Manufacturer: Nelma Data Corporation
Available From: Nelma Data Corporation
Suggested Retail: \$1895.00 for single sided, single density

Kanto

Operating System: MS-DOS, PC-DOS
Processor(s): 8088
RAM: 36K
Printer I/O: One parallel, two serial
Disk Drives Inc: Two 360K floppy
Screen Format: 40/80x25
Graphics: 320/640x200
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: BIOS in ROM
Primary Market: Business
Manufacturer: Micro Computers of Canada
Available From: Micro Computers of Canada
Suggested Retail: \$2495.00



Olivetti M10 Portable

Operating System: MS
Processor(s): 80C85
RAM: 8-32K
Printer I/O: Serial and parallel
Disk Drives Inc: N/A
Screen Format: 40x8
Graphics: Yes
Sound: Yes
Colour: No
Keyboard: Integrated
Software Included: BASIC, Text Processing, Telcom, more
Primary Market: Business, education
Manufacturer: Kyocera
Available From: Olivetti branches and dealers
Suggested Retail: \$499.00 (8K)

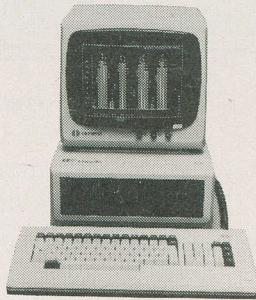


Olivetti M21 Portable

Operating System: MS-DOS
Processor(s): 8086
RAM: 256K
Printer I/O: Serial and parallel, 7 exp. slots
Disk Drives Inc: Two-half-height 5 1/4" floppy
Screen Format: 80x25
Graphics: 320/640x200/400
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS, GWBASIC, tutorial, diagnostics
Primary Market: Business
Manufacturer: Olivetti
Available From: Olivetti branches and dealers
Suggested Retail: \$4225.00

Olivetti M24

Operating System: MS-DOS
Processor(s): 8086
RAM: 256K
Printer I/O: Serial and parallel, 7 exp. slots
Disk Drives Inc: Two half-height 5 1/4" floppy
Screen Format: 80x25
Graphics: 320/640x200/400
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS, GWBASIC, tutorial, diagnostics
Primary Market: Business
Manufacturer: Olivetti
Available From: Olivetti branches and dealers
Suggested Retail: \$4140.00
Optional: 10 Mb HD



Olympia People

Operating System: CP/M and MS-DOS
Processor(s): 8086
RAM: 128K
Printer I/O: Serial and parallel
Disk Drives Inc: Two floppy drives
Screen Format: 80x25
Graphics: 600x485 pixels
Sound: No
Colour: Optional
Keyboard: Detachable
Software Included: WordStar, SuperCalc, dBASE II
Primary Market: Home or business
Manufacturer: Olympia International
Available From: Olympia Business Machines Canada Limited
Suggested Retail: \$4950.00

Orion 0412

Operating System: CP/M
Processor(s): Z80A
RAM: 64K
Printer I/O: Serial; two expansion ports
Disk Drives Inc: Two 5 1/4" floppy
Screen Format: 80x24
Graphics: Optional card; 1024x678 pixels B&W
Sound: No
Colour: Optional c
Keyboard: Detachable
Software Included: CP/M
Primary Market: Business
Manufacturer: DY-4 Systems, Inc.
Available From: DY-4 Systems, Inc.
Suggested Retail: \$3244.00

Osborne 1

Operating System: CP/M
Processor(s): Z80A
RAM: 64K
Printer I/O: Serial and parallel
Disk Drives Inc: Two 5 1/4" floppy
Screen Format: 52x24
Graphics: Graphic characters in ROM
Sound: No
Colour: No
Keyboard: Detachable
Software Included: WordStar, MailMerge, SuperCalc, more
Primary Market: Business
Manufacturer: Osborne Canada
Available From: Lanpar
Suggested Retail: \$1050.00

Osborne Executive

Operating System: CP/M and UCSD p-System
Processor(s): Z80A
RAM: 128K
Printer I/O: Two serial
Disk Drives Inc: Two 5 1/4" SS SD drives
Screen Format: 80x24
Graphics: No
Sound: No
Colour: No
Keyboard: Integrated
Software Included: WordStar, MailMerge, SuperCalc, more
Primary Market: Business
Manufacturer: Osborne Canada
Available From: Lanpar
Suggested Retail: \$1599.00

While CP/M is a wonderful thing in its own right, the Apple computer can also, and usually does, operate under DOS. For this reason, there's a multitude of programs available for it. Below, we offer a mini-multiplicity of our own.

The following programs will operate on any Apple II+, IIe, IIc, or true compatible operating under DOS 3.3. Apple users operating only under ProDOS may have to make alterations to some programs.

Almost Free Apple DOS Software #1

Picture Coder: All Apple HiRes pictures take up 36 sectors in their binary form. This program creates a textfile of a program in memory, squeezing out the zero bytes, that can later be EXECed into memory. The textfile often takes up less room on the disk.

DNA Tutorial: Operating under Integer BASIC, this program might appeal to 'clone' owners. In actuality, though, it's an interactive low-res graphics tutorial of DNA in its inherent forms. And you thought your Apple was only good for games...

Toad: Speaking of games, this program is an Applesoft BASIC implementation of 'Frogger' that can be controlled with either a joystick or the keyboard. The user's high scores are saved to disk.

Function Plotter: A fairly extensive Applesoft BASIC program that takes any inputted function and plots it on the HiRes Screen.

Data Disk Formatter: Apple DOS disks need not be bootable to be useful. This binary program formats a disk without setting DOS on the tracks, conserving useful disk space.

BASIC Trace: A program for the advanced Applesoft programmer, this file, when EXECed, displays the hexdecimal locations of each Applesoft line number of a program in memory.

Gemini Utility: A word processor pre-boot for Gemini printer users, this BASIC program initialises the printer's font or pitch before you boot your word processor.

Payments: This BASIC program allows you to keep track of payments and credits to and from up to 100 accounts on a single disk. A sample account is included.

Database: A small but useful database program in Applesoft BASIC. Sample files are included to get you started.

Nullspace Invaders: A quick BASIC HiRes game testing coordination and judgement as you manipulate a monolith through mysterious gates.

Fine Print: The majority of this software has been obtained from on-line public access sources, and is therefore believed to be in the public domain. Any remaining programs were written in-house. The prices of the disks defer the cost of collecting the programs, debugging them, reproducing and mailing them, plus the cost of the media they're supplied on. The software itself is offered without charge.

Moorshead Publications warrants that the software is readable, and if there are any defects in the medium, we will replace it free of charge. While considerable effort has been made to ensure that the programs have been thoroughly debugged, we are unable to assist you in adapting them for your own applications.

Almost Free Apple DOS Software #2

Amort: A monthly amortization program that calculates monthly payments to an inputted figure, calculates principle, interest on every balance, and prints out the resulting chart.

Voiceprint: An unusual program that uses the HiRes screen to sample sounds inputted through the cassette jacks at the back of your Apple. Sampling rate and other variables can be controlled, and two sounds may be compared side-by-side.

Calc NOW!: Written in BASIC, this spreadsheet program is somewhat slower than VisiCalc, but still offers the power you expect from a spreadsheet. With sample files.

Cavern Crusader: A mix of BASIC and binary programming, winning this HiRes game is difficult, to say the least. For every wave of aliens shot in the cavern, there's always a meaner bunch in the wings.

Newcout: With source file. This binary program replaces the I/O hooks in the Apple with its own so you can operate your Apple through the HiRes screen. Comes with a character set.

Charset Editor: A utility to help you create your own character sets to use with Newcout.

Calendar: A BASIC utility useful for finding a particular day of any inputted month and year, or for printing out any given year.

LCLODR: With source. This binary utility BLOADs any given file into the 16K language card space at \$D000. The source is useful in showing how to use DOS commands through assembly language.

Cristo Rey: An animated HiRes BASIC program showing Cristo Rey by moonlight. For apartment-bound romantics.

ATOT: That's an acronym for 'Applesoft to Text'. EXEC this textfile to produce a textfile of your program.

Applesoft Deflator: This program takes a textfile made by ATOT and squeezes it, replacing PRINT statements with '?' and removing unnecessary spaces from the listing.

Almost Free Apple DOS Software #3

General Ledger: A fairly massive BASIC General Ledger program. This program creates a number of files, so it's best put on a separate disk before implemented.

EE-Design: A shape design aid program written in BASIC. Allows the user to plot shapes in HiRes and either save them to disk or print them out.

Quickzap: A disk sector utility that reads a given track and sector into memory and allows you to alter it, and optionally write it back to disk.

Softgraph: A complete graphing program written in both Applesoft and binary that enables you to see your data done up professionally in pie, line or bar charts.

IntelliCalc: An intelligent calculator with three memories and a 'paper tape' readout. Data may be inserted at any point.

Poker!: An Applesoft BASIC implementation of the game that has ruined many a marriage. Fortunately, you can afford to lose your electronic paycheque to you Apple... for now.

Polar Graphics: Similar in some ways to Function Plotter, this Applesoft program supplies a number of attractive functions in REM statements that you may utilize to plot out on the HiRes screen.

Clock and Clock II: Two Applesoft digital clocks. When your Apple's doing nothing better, it can now remind you of the time you're wasting. One has an alarm function.

Flowers: With source. A binary program that prints a border of flowers to the HiRes screen. The source is invaluable in showing how to handle HiRes shapes in assembly language.

Convert Utility: A BASIC program that converts numbers between decimal, hexadecimal, binary and disk sectors.

ProDOSfix.TXT: Apple clone users who've purchased ProDOS will note that it doesn't work on their machines. This text tutorial explains why, and how to remedy the problem.

Each disk is
\$19.95
or, as an introductory offer you
can order all three for
\$39.95
Telephone order credit card
payments accepted.
Ontario residents please add 7%
Provincial Sales Tax.

Software Services
Moorshead Publications
25 Overlea Boulevard,
Suite 601,
Toronto, Ontario M4H 1B1
(416) 423-3262

Introducing: SmarTEAM™ 103/212A

HAYES COMPATIBLE MODEM

The Most Successful Modem From The Far East
Introduced during The Fall '84 COMDEX Show

2 YEAR WARRANTY

Software Included



FEATURES:

- 0-300/1200 bps
- Auto Dial/Auto Answer
- Auto Speed Selection
- Status Indicators
- Switch Selectable
- Speed Volume Control • Self Test

Fully Compatible with Hayes Smartmodem 1200
Works with SmartCom, CrossTalk and PC Talk.

DEALERS: DON'T MISS THE LATEST TECHNOLOGY

Exclusive Canadian Distributor:

BUDGETRON INC.

We are Signing up
Dealers Across Canada
Call Us Now!!

1601 Matheson Blvd., Unit 3,
Mississauga, Ontario L4W 1H9
Tel.: (416) 624-7323 Telex: 06-960172

Hayes and SmartCom are registered Trademarks of Hayes Microcomputer Products Inc.

Circle No. 13 on Reader Service Card

PC-8800

Operating System: CP/M
Processor(s): uPD780C (Z80 compatible)
RAM: 64K
Printer I/O: One serial, one parallel
Disk Drives Inc: Optional dual 5 1/4" or 8" DSDD floppy
Screen Format: 40/80x20/25
Graphics: 640x200/400
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: WordStar, MailMerge, MultiPlan, CP/M, 2 BASICs
Primary Market: Business
Manufacturer: NEC Corporation
Available From: Electronic Distributors (Canada)
Suggested Retail:



Panama XT

Operating System: Optional; MS-DOS or CP/M-86
Processor(s): 8088
RAM: 256K
Printer I/O: One serial, one parallel
Disk Drives Inc: One 5 1/4" floppy, 25 Mb HD
Screen Format: 40/80x24
Graphics: 640x320
Sound: Yes
Colour: Choice
Keyboard: Detachable; also has French characters
Software Included: Sidekick
Primary Market: Business
Manufacturer: Ogivar Inc.
Available From: Ogivar Inc., local dealers
Suggested Retail: \$4700.00

Panasonic Sr. Partner

Operating System: MS-DOS 2.11
Processor(s): 8088
RAM: 128K
Printer I/O: One parallel, one serial, integrated printer
Disk Drives Inc: One or two DS DD 5 1/4" floppy, or one with 10Mb HD
Screen Format: 80x25
Graphics: 320/640x200
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: WordStar, VisiCalc, pfs:File/Report/Graph, more
Primary Market: Business
Manufacturer: Panasonic
Available From: Panasonic
Suggested Retail: \$3395.00 (one drive); \$3995.00 (two);

Philips PC

Operating System: MS-DOS 1.25
Processor(s): 8088
RAM: 128K
Printer I/O: Parallel and serial
Disk Drives Inc: Two 5 1/4" floppy
Screen Format: 40/80x25
Graphics: 640x325 pixels
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: Multi-Mate, GW BASIC, PC Tutor, MS-DOS
Primary Market: Business
Manufacturer: Corona
Available From: Philips Information Systems
Suggested Retail: \$3665.00; 256K running MS-DOS 2.0 is \$3990.00

President Ex.

Operating System: MS-DOS
Processor(s): 80286
RAM: 640K
Printer I/O: Two serial and two parallel
Disk Drives Inc: One 1.2 Mb 5 1/4" floppy, one 360K 5 1/4" floppy, optional 10-250 Mb HD
Screen Format: 40/80x25
Graphics: 720x348
Sound: Yes
Colour: No
Keyboard: Detachable
Software Included: MS-DOS 2.1
Primary Market: Business
Manufacturer: President Computer Corp.
Available From: President Computer Corp.
Suggested Retail: \$5995.00 including monitor



Peach Executive

Operating System: BASIC
Processor(s): 6502 and Z80A
RAM: 128K
Printer I/O: Optional serial or parallel
Disk Drives Inc: Two 5 1/4" drives
Screen Format: 40/80x24
Graphics: 280x192 pixels
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: BASIC
Primary Market: Business
Manufacturer: Peach Microsystems
Available From: Peach Microcentre
Suggested Retail: \$2350.00 including monitor

Pied Piper

Operating System: CP/M
Processor(s): Z80A
RAM: 64K
Printer I/O: Parallel
Disk Drives Inc: One 5 1/4" floppy
Screen Format: 80x24
Graphics: 10 graphics characters
Sound: No
Colour: No
Keyboard: Integrated
Software Included: Perfect Writer/Speller/Filer/Calc
Primary Market: Home or business
Manufacturer: Semi-Tech Microelectronics
Available From: Semi-tech Microelectronics
Suggested Retail: \$1799.00

Pied Piper Professional

Operating System: CP/M
Processor(s): Z80A
RAM: 64K
Printer I/O: One serial, one parallel
Disk Drives Inc: Two 5 1/4" floppy
Screen Format: 80x24
Graphics: 10 graphics characters
Sound: No
Colour: No
Keyboard: Integrated
Software Included: CBASIC, Perfect software, terminal package
Primary Market: Business
Manufacturer: Semi-Tech Microelectronics
Available From: Semi-Tech Microelectronics
Suggested Retail: \$2775.00

President Sr.

Operating System: MS-DOS
Processor(s): 8088
RAM: 256K
Printer I/O: One serial and one parallel
Disk Drives Inc: One 10 Mb hard disk, one DS DD 5 1/4" floppy
Screen Format: 40/80x25
Graphics: 720x348 pixels
Sound: Yes
Colour: No
Keyboard: Detachable
Software Included: MS-DOS 2.1
Primary Market: Business
Manufacturer: President Computer Corp.
Available From: President Computer Corp.
Suggested Retail: \$3995.00 including monitor

Psion Organiser

Operating System: BASIC
Processor(s): HD6301X
RAM: 2K
Printer I/O: One serial
Disk Drives Inc: 8K or 16K datapaks
Screen Format: 16x1 LCD
Graphics: No
Sound: No
Colour: No
Keyboard: Integrated
Software Included: BASIC, filer, clock, calculator
Primary Market: Business, student
Manufacturer: Psion Processors, Britain
Available From: Electronic Distributors Inc.
Suggested Retail: \$199.95

QCAL 1000

Operating System: BASIC or CP/M
Processor(s): 6502 and Z80
RAM: 64K
Printer I/O: Optional serial or parallel
Disk Drives Inc: Optional dual 5 1/4" slimline floppy
Screen Format: 40x24
Graphics: 280x192 pixels
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: BASIC
Primary Market: Business or home
Manufacturer: QCAL International
Available From: Pacific Rim Electronic Imports
Suggested Retail: \$849.00

QCAL 500

Operating System: BASIC
Processor(s): 6502
RAM: 64K
Printer I/O: Optional serial or parallel
Disk Drives Inc: Cassette interface; optional 5 1/4" floppy
Screen Format: 40x24
Graphics: 280x192 pixels
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: BASIC
Primary Market: Home or business
Manufacturer: QCAL International
Available From: Pacific Rim Electronic Imports
Suggested Retail: \$549.00

QCAL 8000

Operating System: N/A
Processor(s): 8088
RAM: 128K
Printer I/O: Five expansion slots
Disk Drives Inc: One DS DD 5 1/4" floppy
Screen Format: 40/80x25
Graphics: N/A
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: N/A
Primary Market: Business
Manufacturer: QCAL International
Available From: Pacific Rim Electronic Imports
Suggested Retail: \$2295.00

QCAL 900

Operating System: BASIC or CP/M
Processor(s): 6502 and Z80
RAM: 64K
Printer I/O: Optional serial or parallel
Disk Drives Inc: Optional 5 1/4" floppy
Screen Format: 40x24
Graphics: 280x192 pixels
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: BASIC
Primary Market: Business or home
Manufacturer: QCAL International
Available From: Pacific Rim Electronic Imports
Suggested Retail: \$699.00

ROLM Cedar

Operating System: MS-DOS
Processor(s): 8088
RAM: 384K
Printer I/O: One parallel, one asynch. comm (up to 19.2 Kilobaud)
Disk Drives Inc: Two 5 1/4" 360K floppy
Screen Format: 80x25
Graphics: 320/640x200
Sound: Yes
Colour: No
Keyboard: Detachable
Software Included: MS-DOS, GWBASIC, Personal Communications
Primary Market: Business
Manufacturer: ROLM Corporation
Available From: ROLM Canada
Suggested Retail:

Radio Shack PC-4

Operating System: BASIC
Processor(s): Proprietary
RAM: 1/2K
Printer I/O: Optional
Disk Drives Inc: Optional cassette
Screen Format: 12 character LCD
Graphics: N/A
Sound: No
Colour: No
Keyboard: Integrated
Software Included: BASIC
Primary Market: Business or home
Manufacturer: Tandy
Available From: Radio Shack
Suggested Retail: \$99.95



STM Personal Computer

Operating System: MS-DOS 2.11
Processor(s): 80186 (8 MHz)
RAM: 256K
Printer I/O: One parallel, two serial. Integrated printer with portable
Disk Drives Inc: Two 720K (formatted) DS DD 5 1/4" drives
Screen Format: 80x25; 80x25 LCD (portable)
Graphics: 640x200 pixels colour, 720x348 pixels monochrome
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS, telephone/modem support
Primary Market: Business
Manufacturer: Semi-Tech Microelectronics Corporation
Available From: Semi-Tech Microelectronics, local dealers
Suggested Retail: \$3699.00; \$4989.00 portable



Sanyo MBC 1100/1150

Operating System: CPM 2.2
Processor(s): Z80A
RAM: 64K
Printer I/O: Parallel and serial
Disk Drives Inc: One 5 1/4" floppy (1100) or two (1150)
Screen Format: 80x25
Graphics: N/A
Sound: No
Colour: No
Keyboard: Detachable
Software Included: CPM 2.2 and BASIC
Primary Market: Business
Manufacturer: Sanyo
Available From: Sanyo
Suggested Retail: \$2595.00 (1100); \$3195.00 (1150)

Sanyo MBC 550/555

Operating System: MS-DOS
Processor(s): 8088
RAM: 128K
Printer I/O: Optional serial
Disk Drives Inc: One 160K floppy (550) or two (555); 550-1 and 555-1 are 360K
Screen Format: 80x25
Graphics: 640x200 pixels
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: BASIC, MS-DOS
Primary Market: Home or business
Manufacturer: Sanyo
Available From: Sanyo
Suggested Retail: \$1095(550); \$1295(550-1); \$1495(555); \$1895(555-1)

Sanyo MBC 775

Operating System: MS-DOS
Processor(s): 8088 (8 MHz)
RAM: 256K
Printer I/O: One parallel
Disk Drives Inc: Two 360K floppy
Screen Format: 40/80x25
Graphics: 320/640x200
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS, GWBASIC, WordStar, CalcStar
Primary Market: Business
Manufacturer: Sanyo
Available From: Sanyo
Suggested Retail: \$3495.00 (includes 9" colour monitor)



Seequa PC

Operating System: MS-DOS or CP/M 80
Processor(s): 8088 and Z80
RAM: 128K; expandable to 640K
Printer I/O: Serial and parallel
Disk Drives Inc: One DS DD 5 1/4" floppy
Screen Format: 40/80x25
Graphics: 320/640x200 pixels
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: Same as Chameleon Plus
Primary Market: Business
Manufacturer: Sequa Computer Corporation
Available From: Golden Maple Leaf
Suggested Retail: \$2995.00; Other configurations available

Seequa XT

Operating System: MS-DOS or CP/M 80
Processor(s): Z80 and 8088
RAM: 256K; expandable to 640K
Printer I/O: Serial and parallel; four expansion slots
Disk Drives Inc: One DS DD 5 1/4" floppy, one 10 Mb hard drive
Screen Format: 80x24
Graphics: 320/640x200 pixels
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: Same as Chameleon Plus
Primary Market: Business
Manufacturer: Sequa
Available From: Golden Maple Leaf
Suggested Retail: \$4995.00; Other configurations available



Sharp PC 1500

Operating System: BASIC
Processor(s): C-MOS
RAM: 2.6K
Printer I/O: Optional printer/cassette interface
Disk Drives Inc: Optional printer/cassette interface
Screen Format: 26x1 LCD
Graphics: 7x156 pixels
Sound: Yes
Colour: No
Keyboard: Integrated
Software Included: BASIC
Primary Market: Home or business
Manufacturer: Sharp
Available From: Total Office Systems
Suggested Retail: \$299.95

Sharp PC 5000

Operating System: MS-DOS
Processor(s): 8088 and C-MOS
RAM: 128K
Printer I/O: Serial
Disk Drives Inc: Opt. 128K bubble cartridge
Screen Format: 80x8 LCD
Graphics: 640x80 pixels
Sound: No
Colour: No
Keyboard: Integrated
Software Included: N/A
Primary Market: Business
Manufacturer: Sharp Electronics
Available From: Total Office Systems
Suggested Retail: \$2695.00, not including printer and drive



Sharp YX 3200

Operating System: CP/M and FDOS
Processor(s): YX-3200
RAM: 64K
Printer I/O: Parallel and serial expansion
Disk Drives Inc: Optional 5 1/4" or 8" floppy
Screen Format: 80x25
Graphics: N/A
Sound: No
Colour: No
Keyboard: Integrated
Software Included: Two BASICs
Primary Market: Home or Business
Manufacturer: Sharp
Available From: Total Office Systems
Suggested Retail: \$2395.00

Sinclair QL

Operating System: QDOS, SuperBASIC
Processor(s): 68008, 8049
RAM: 128K
Printer I/O: Two serial, networking port
Disk Drives Inc: Two 100K microdrives (cartridge tap
Screen Format: 40/60/85x25
Graphics: 256/512x256
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: Integrated WP, spreadsheet, database, graphing
Primary Market: Business
Manufacturer: Sinclair Research Limited
Available From: Gladstone Electronics
Suggested Retail: \$799.95

Solution 5000 PC

Operating System: MS-DOS 2.11
Processor(s): 8088
RAM: 128K, 256K for portable model
Printer I/O: One serial, one parallel, 5 slots
Disk Drives Inc: Two 360K DS DD 5 1/4" floppy
Screen Format: 40/80x25
Graphics: 640x200 pixels
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS, Electric Pencil, K.I.S. Accounting
Primary Market: Business
Manufacturer: Ace Micro-Electronics Corporation
Available From: Ace Micro-Electronics Corporation
Suggested Retail: Ace Micro-Electronics Corporation



Sony SMC-70

Operating System: CP/M
Processor(s): Z80A
RAM: 64K
Printer I/O: Serial, parallel, five expansion ports
Disk Drives Inc: Optional SS DD 3 1/2" floppy
Screen Format: 80x25
Graphics: 640x400 pixels
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: CP/M
Primary Market: Business
Manufacturer: Sony
Available From: Sony Canada Ltd.
Suggested Retail: \$1895.00 base price



Sord M23P

Operating System: CP/M compatible
Processor(s): Z80A, PIPS
RAM: 128K
Printer I/O: Two S, P, and three expansion slots
Disk Drives Inc: Two 3 1/2" floppy drives
Screen Format: 80x8 LCD
Graphics: 640x64
Sound: No
Colour: Optional
Keyboard: Integrated
Software Included: Spreadsheet
Primary Market: Business
Manufacturer: Sord
Available From: Micos Computer Systems Inc.
Suggested Retail: \$3800.00

Blue Chip

Operating System: MS-DOS
Processor(s): 8088
RAM: 640K
Printer I/O: One parallel
Disk Drives Inc: Two 360K 5 1/4" floppy
Screen Format: 80x25
Graphics: Optional
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: BIOS in ROM
Primary Market: Business
Manufacturer: Blue Chip Computers
Available From: Blue Chip Computers
Suggested Retail: \$3495.00 including Quadram monitor



Sord M68

Operating System: N/A
Processor(s): MC68000, Z80A
RAM: 256K
Printer I/O: Two serial, parallel, IEEE bus
Disk Drives Inc: Two 5" mini floppy
Screen Format: 80x25
Graphics: 640x400 pixels
Sound: No
Colour: Optional
Keyboard: Detachable
Software Included: N/A
Primary Market: Business
Manufacturer: Sord
Available From: Micos Computer Systems, Inc.
Suggested Retail: \$7294.00

Spectravideo SV-318

Operating System: BASIC
Processor(s): Z80A
RAM: 32K
Printer I/O: Expansion bus
Disk Drives Inc: Cassette driven; optional floppy
Screen Format: 40x24
Graphics: 256x192; 32 sprites
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: BASIC
Primary Market: Home
Manufacturer: Spectravideo
Available From: Spectravideo
Suggested Retail: \$199.00

Spectravideo SV-328

Operating System: Microsoft BASIC
Processor(s): Z80A
RAM: 80K
Printer I/O: Optional expander available
Disk Drives Inc: Cassette driven. Optional 5 1/4" floppy
Screen Format: 40x24. Optional 80 column cartridge
Graphics: 256x192 pixels; 32 sprites
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: BASIC
Primary Market: Home/business
Manufacturer: Spectravideo
Available From: Spectravideo Canada
Suggested Retail: \$499.95

Spectravideo SV-728

Operating System: MSX
Processor(s): Z80A
RAM: 80K
Printer I/O: Optional expander available
Disk Drives Inc: Same as SV-328
Screen Format: Same as SV-328
Graphics: 256x192
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: BASIC, MSX
Primary Market: Home
Manufacturer: Spectravideo
Available From: Spectravideo Canada
Suggested Retail: \$599.95

Sperry Personal Computer

Operating System: MS-DOS
Processor(s): 8088
RAM: 128K
Printer I/O: Serial
Disk Drives Inc: One or two 5 1/4" floppy or 10 mb hard
Screen Format: 40/80x25
Graphics: 320x200, 320x400, 640x200 or 640x400
Sound: No
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS
Primary Market: Business
Manufacturer: Sperry Inc.
Available From: Sperry Inc.
Suggested Retail: \$3970.00

FINALLY.

SOFTWARE FOR PEOPLE WHO PLAY HARDBALL.

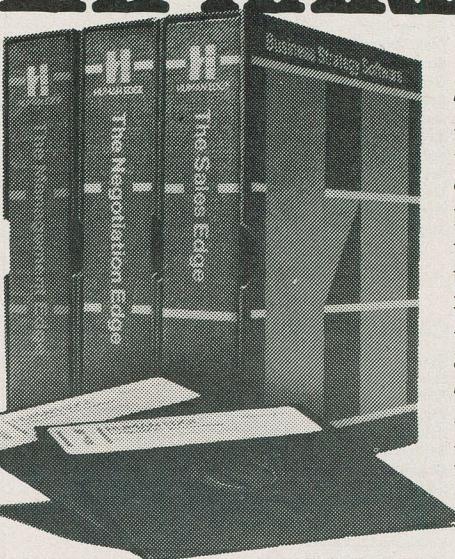
Now you can get the edge in business. And in life.

To succeed in business it's no longer who you know, it's how well you know them. That's the Human Edge™. The insight to know who's thinking what. The ability to know how someone's going to react before they do. And the forethought to remove road blocks before they ever come up.

Business Strategy Software that some say isn't fair play.

Human Edge computer programs are so humanly smart, tough, and tactical, it's a downright shame to call them software.

By answering simple questions about yourself and your adversary you can discover exactly where your interests and theirs intersect. Which situations to avoid. And get a printout of their strengths and their weaknesses.



"Amazing Mind Prober"
Use it to probe someone's mind

Orwell Said It Would Happen. And It Has.

Mind Prober
COMING SEPTEMBER 15
1984.

"New program promises to make 1984 a reality" — InfoWorld 8/6/84

What does it do?

Enables you to:

- Read others like a book.
- Understand why someone behaves as he does.
- Accurately predict what someone will do in a given situation.
- Learn to interpret another's nonverbal clues.
- Discover the things most people are afraid to tell you about themselves.
- Have a scientifically accurate personality profile of anyone — in minutes.
- Sharpen your perceptions and communication style.

Now also available for Macintosh and Commodore

THE MANAGEMENT EDGE™ helps you better analyze, understand and manage the people you work with. So you can hold the bright ones, lose the losers, and keep an easy grip on the reins.

THE NEGOTIATION EDGE™ helps you size up your worthy opponents.

You see where they're strong. And you can find where they're not. Whether what's on the table is a property deal, a merger, or the promotion you're overdue.

THE SALES EDGE™ helps you get a better handle on your prospect. You'll know when to be aggressive, and when to back down. Is your prospect looking for details, or just an overview? It will show you how to prepare, open and close. So you'll sell them the way they want to be sold.

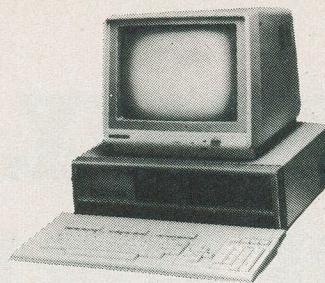
HUMAN EDGE

Phase 4 Distributors Inc.
7157 Fisher Rd. S.E.
Calgary, Alberta T2H 0W4
(403) 252-0911

Circle No. 26 on Reader Service Card

TAVA PC

Operating System: N/A
Processor(s): 8088
RAM: 64K
Printer I/O: Two serial, one parallel
Disk Drives Inc: One 5 1/4" floppy
Screen Format: 40/80x25
Graphics: 640x320 pixels
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: N/A
Primary Market: Business
Manufacturer: TAVA Corporation
Available From: Nielsen Computers Inc.
Suggested Retail: \$2995.00



TEO TPC 8300

Operating System: BASIC
Processor(s): CMOS
RAM: 6K
Printer I/O: Parallel
Disk Drives Inc: Printer/plotter/cassette interface available
Screen Format: 48x2 LCD
Graphics: 255 graphic characters
Sound: No
Colour: No
Keyboard: Integrated
Software Included: Extended Pocket BASIC
Primary Market: Business
Manufacturer: TEO Computers
Available From: TEO Computers
Suggested Retail: \$449.00

TEO Tiger 4000

Operating System: BASIC
Processor(s): 6502 and Z80A
RAM: 64K
Printer I/O: Optional serial or parallel
Disk Drives Inc: Optional 5 1/4" floppy or cassette
Screen Format: 40x24
Graphics: 280x192 pixels
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: Spreadsheet, word processor
Primary Market: Home or business
Manufacturer: TEO Computers
Available From: TEO Computers
Suggested Retail: \$1595.00

TEO Tiger Personal

Operating System: BASIC
Processor(s): 6502 and Z80A
RAM: 64K
Printer I/O: Optional serial or parallel
Disk Drives Inc: Two 5 1/4" floppy
Screen Format: 40x24
Graphics: 280x192 pixels
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: N/A
Primary Market: Home or Business
Manufacturer: TEO Computers
Available From: TEO Computers
Suggested Retail: \$1595.00

TI Pro-Lite

Operating System: MS-DOS
Processor(s): 8088
RAM: 256K
Printer I/O: One port
Disk Drives Inc: One 720K 5 1/4" floppy
Screen Format: 80x25 LCD
Graphics: Yes
Sound: Yes
Colour: No
Keyboard: Integrated
Software Included: Business
Primary Market: Texas Instruments Inc.
Manufacturer: Texas Instruments Inc.
Available From: Texas Instruments Inc.
Suggested Retail: \$4750.00

TI Professional Computer

Operating System: Choice of MS-DOS, CPM/80, CPM-86, UCSD
Processor(s): 8088
RAM: 128K
Printer I/O: Serial, five expansion ports
Disk Drives Inc: One 5 1/4" floppy
Screen Format: 80x25
Graphics: 720x300 pixels
Sound: No
Colour: Optional
Keyboard: Detachable
Software Included: Variable
Primary Market: Business
Manufacturer: Texas Instruments
Available From: Authorized dealers
Suggested Retail: \$3445.00

Corona PC 400

Operating System: MS-DOS
Processor(s): 8088
RAM: 256K
Printer I/O: One parallel, one serial, four exp. slots
Disk Drives Inc: Dual 360K 5 1/4" slimline floppy
Screen Format: 80x25
Graphics: 640x200/400
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS, GWBASIC, PC Tutor
Primary Market: Business
Manufacturer: Corona
Available From: SGV
Suggested Retail: \$4295.00



TRS-80 2000

Operating System: MS-DOS
Processor(s): 80186
RAM: 256K
Printer I/O: Serial, 4 expansion slots
Disk Drives Inc: Two slimline 5 1/4" floppy
Screen Format: 80x24
Graphics: 640x400 pixels
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS
Primary Market: Business
Manufacturer: Tandy
Available From: Radio Shack
Suggested Retail: \$3699.00 2 floppy drives; \$5799.00 with one and 10 Mb HD

TRS-80 Color Computer 2

Operating System: BASIC
Processor(s): 6809E
RAM: 16K
Printer I/O: Serial
Disk Drives Inc: Optional disk drives or cassette
Screen Format: 32x16
Graphics: 256x192 pixels
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: BASIC
Primary Market: Home
Manufacturer: Tandy
Available From: Radio Shack
Suggested Retail: \$189.95

TRS-80 Model 100

Operating System: Extended BASIC
Processor(s): 80C85
RAM: 8K
Printer I/O: Parallel
Disk Drives Inc: Cassette or optional 5 1/4" storage
Screen Format: 40 char. x 8 line LCD
Graphics: Yes
Sound: Yes
Colour: No
Keyboard: Integrated
Software Included: N/A
Primary Market: Business
Manufacturer: Tandy
Available From: Radio Shack
Suggested Retail: \$529.00; 24K version \$829.00

TRS-80 Model 12

Operating System: TRS-DOS
Processor(s): Z80
RAM: 80K
Printer I/O: Two serial and two parallel
Disk Drives Inc: Two DS DD 8" floppy
Screen Format: 40/80x24
Graphics: 32 business graphics characters
Sound: No
Colour: No
Keyboard: Detachable
Software Included: TRS-DOS, BASIC
Primary Market: Business
Manufacturer: Tandy
Available From: Radio Shack
Suggested Retail: \$299.00



TRS-80 Model 4

Operating System: TRSDOS
Processor(s): Z80A
RAM: 64K
Printer I/O: Parallel
Disk Drives Inc: Two SS DD 5 1/4" floppy
Screen Format: 80x24
Graphics: Optional 640x240 pixels
Sound: Yes
Colour: No
Keyboard: Integrated
Software Included: TRSDOS, BASIC
Primary Market: Business
Manufacturer: Tandy
Available From: Radio Shack
Suggested Retail: \$1999.00

TRS-80 Model 4P

Operating System: Microsoft 5.0, TRSDOS 6.0
Processor(s): Z80A
RAM: 64K
Printer I/O: Parallel
Disk Drives Inc: Two 5 1/4" floppy drives
Screen Format: 80x24
Graphics: Optional 640x240 pixel graphics
Sound: Yes
Colour: No
Keyboard: Detachable
Software Included: Operating systems
Primary Market: Business
Manufacturer: Tandy
Available From: Radio Shack
Suggested Retail: \$1999.00

Computer Fair Exhibitors save 10% on Exhibits

booked before March 31st.



C.A.W. DISPLAYS
5151 Everest Drive,
Unit 8, Mississauga,
Ont. L4W 2Z3
TEL. (416) 624-0989

**Free Consultation
Free Installation & Removal
Standard Exhibits —
Custom Design**

C.A.W. DISPLAYS highly skilled personnel enable us to offer you the highest quality in exhibits, office interiors, and store fixtures.

Circle No. 25 on Reader Service Card

For more information, call or visit our Showroom

ZCPR2 for the Apple][+

Apple CP/M is funky at best . . . and down right nasty most of the rest of the time. It has weirdnesses in it that most humans wouldn't want to see at two in the morning on the late show. If curses work the people who wrote it will spend the afterlife so far down they'll be able to roast marshmallows by holding them over their heads.

It's a treat.

There are a few things one can do to make CP/M run better on the Apple . . . one of the most promising is to install ZCPR2 in it. Suddenly, your system will reboot, your life will become meaningful again, the speaker will sing like Pavarotti or Roger Daltrey . . . your choice . . . and you'll live for a million years. Or something like that.

In fact, ZCPR2, when properly installed, will allow you to customize the user interface of CP/M to optimize it for your needs. Whether you program, process words, spread sheets or just generally compute you can make CP/M behave in the most advantageous way for what you're up to.

In fact, ZCPR2 doesn't install easily on the Apple in its usual incarnation. We figured out a way to do it, patched it to remove a few of the wrinkles Apple CP/M normally has and included a detailed instruction file to make the whole thing fairly painless.

In order to use the Apple ZCPR2 package, you will need

An Apple][+ or compatible system with 64K of RAM.

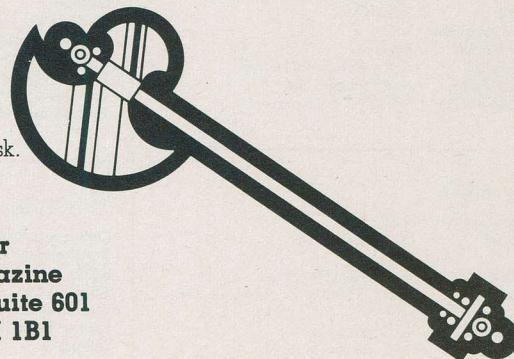
A Z80 Softcard and Microsoft CP/M master.

MAC.COM, CPM56.COM and DDT.COM.

Two Drives

Some knowledge of using assembly language and, of course, our disk.

The disk is available for



\$22.95

**Apple ZCPR2 Offer
Computing Now! Magazine
25 Overlea Boulevard, Suite 601
Toronto, Ontario M4H 1B1**

Fine Print:

1. The entire ZCPR2 package is in the public domain. We are not charging a fee for this code. The cost of this package is to defer the cost of the media, shipping, handling and the patches and preparation done by us.

2. Every effort has been made to insure that Apple ZCPR2 will function properly in the environment for which it was designed. Please note that we cannot assist you in adapting it for special applications or for unusual computers.

TS 1605 Personal Computer

Operating System: TeleDOS
Processor(s): 8088
RAM: 256K
Printer I/O: One parallel, one serial
Disk Drives Inc: Two slim-line DS DD 5 1/4" floppy
Screen Format: 80x25
Graphics: 640x200 pixels
Sound: No
Colour: Yes
Keyboard: Detachable
Software Included: TeleDOS, TeleBASIC
Primary Market: Business
Manufacturer: Televideo
Available From: Datamex
Suggested Retail: \$4888.00 base includes colour monitor

Tandy 200

Operating System: BASIC
Processor(s): 80C85
RAM: 24K
Printer I/O: One parallel, one serial; modem
Disk Drives Inc: Cassette driven; optional floppy
Screen Format: 40/16 LCD
Graphics: 240x128
Sound: Yes
Colour: No
Keyboard: Integrated
Software Included: Multiplan, word processor, more
Primary Market: Business, home
Manufacturer: Tandy Electronics
Available From: Radio Shack Stores
Suggested Retail: \$1399.00

Tandy 1000

Operating System: MS-DOS
Processor(s): 8088
RAM: 128K
Printer I/O: One 360K floppy
Disk Drives Inc: 40/80x25
Screen Format: 320/640x200
Graphics: Yes
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS, BASIC, DeskMate
Primary Market: Business
Manufacturer: Tandy Electronics Limited
Available From: Radio Shack outlets
Suggested Retail: \$1749.00 (one drive)

Tandy 1200 HD

Operating System: MS-DOS (optional)
Processor(s): 8088
RAM: 256K
Printer I/O: One parallel
Disk Drives Inc: One 360K floppy, one 10 Mb HD
Screen Format: Optional 40/80x25
Graphics: Optional card
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: N/A
Primary Market: Business
Manufacturer: Tandy Electronics Limited
Available From: Radio Shack outlets
Suggested Retail: \$3699.00 (base price)

Tandy 6000

Operating System: XENIX
Processor(s): 68000, Z80A
RAM: 512K
Printer I/O: Two serial, one parallel
Disk Drives Inc: Two 1.25 Mb 8" or one with 15 Mb HD
Screen Format: 40/80x24
Graphics: 32 characters in ROM
Sound: Yes
Colour: No
Keyboard: Detachable
Software Included: XENIX
Primary Market: Business
Manufacturer: Tandy Electronics
Available From: Radio Shack stores
Suggested Retail: \$6599.00; \$7999.00 with hard disk

Direct HPC-FM

Operating System: MS-DOS 2.0
Processor(s): 8088
RAM: 256K
Printer I/O: Two serial, one parallel
Disk Drives Inc: Two 360K 5 1/4" floppy
Screen Format: 80/132x27
Graphics: Optional
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: MS-DOS 2.0 GWBASIC
Primary Market: Business
Manufacturer: Direct Incorporated
Available From: Datamex
Suggested Retail: \$5143.00 including 12" amber monitor



Texas Instruments Portable

Operating System: MS-DOS
Processor(s): 8088
RAM: 128K
Printer I/O: Serial and parallel
Disk Drives Inc: One half-height 5 1/4" floppy
Screen Format: 80x25
Graphics: 720x300 pixels
Sound: Yes
Colour: Optional
Keyboard: Detachable
Software Included: MS-DOS
Primary Market: Business
Manufacturer: Texas Instruments
Available From: Texas Instruments
Suggested Retail: \$3475.00

Charles River Data System

Operating System: UNIX System V
Processor(s): Twin 68000s
RAM: 256K (expandable to 8 Mb)
Printer I/O: Four serial
Disk Drives Inc: One 1 Mb floppy, one 10 Mb HD (expandable to 2 gigabytes)
Screen Format: 80x25
Graphics: 640x200/400
Sound: Yes
Colour: Yes
Keyboard: Requires terminal addition
Software Included: N/A
Primary Market: Business
Manufacturer: Charles River Data Systems
Available From: Miccos Computer Systems Inc.
Suggested Retail: \$19000.00

TeleVideo TPC II

Operating System: TeleDOS
Processor(s): 8088
RAM: 256K
Printer I/O: One serial, one parallel
Disk Drives Inc: Two 5 1/4" 360K floppy
Screen Format: 40/80x25
Graphics: 320/640x200
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: TeleDOS, GWBASIC
Primary Market: Business
Manufacturer: TeleVideo
Available From: Datamex Limited
Suggested Retail: \$3937.00

TeleVideo TS 1603

Operating System: CP/M-86
Processor(s): 8088
RAM: 128K
Printer I/O: Serial
Disk Drives Inc: Two 5 1/4" floppy
Screen Format: 80x24
Graphics: Optional
Sound: No
Colour: No
Keyboard: Detachable
Software Included: CP/M-86 and MMM Ost
Primary Market: Business
Manufacturer: Televideo
Available From: Datamex
Suggested Retail: \$4888.00 includes 14" monitor

TeleVideo TS 803

Operating System: CP/M
Processor(s): Z80A
RAM: 64K
Printer I/O: Serial
Disk Drives Inc: Two 5 1/4" floppy
Screen Format: 80x24
Graphics: 640x240 pixels
Sound: No
Colour: No
Keyboard: Detachable
Software Included: CP/M
Primary Market: Business
Manufacturer: Televideo
Available From: Datamex
Suggested Retail: \$2943.00 includes 14" screen

The Big Blue Board

Operating System: MS-DOS or CP/M-86
Processor(s): 8088 (optional 8087)
RAM: 128K; expandable to 256K
Printer I/O: Optional card
Disk Drives Inc: One slimline 5 1/4" floppy
Screen Format: 80x24
Graphics: 640x200 pixels
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: DOS BIOS in EPROM
Primary Market: Business
Manufacturer: Robin Hood Electronics
Available From: Robin Hood Electronics
Suggested Retail: \$2495.00 including monitor and keyboard

The Link

Operating System: SNAP
Processor(s): 6502
RAM: 8K
Printer I/O: Peripheral connector
Disk Drives Inc: 8 or 16K RAM modules
Screen Format: 26 character LCD
Graphics: 159x8
Sound: No
Colour: No
Keyboard: Integrated
Software Included: Integrated
Primary Market: Business
Manufacturer: Matsushita
Available From: Panasonic
Suggested Retail:

The Portable

Operating System: MS-DOS, P.A.M.
Processor(s): 8086
RAM: 272K
Printer I/O: One serial, one HP-IL
Disk Drives Inc: RAM disk; optional 710K 3 1/2" floppy
Screen Format: 80x16 LCD
Graphics: 480x128 pixels
Sound: Yes
Colour: No
Keyboard: Integrated
Software Included: Lotus 1-2-3, MS-DOS, P.A.M., WP,
Primary Market: terminal
Manufacturer: Business
Available From: Hewlett-Packard
Suggested Retail: \$5158.00

The President

Operating System: MS-DOS
Processor(s): 8088
RAM: 256K
Printer I/O: One serial, one parallel
Disk Drives Inc: Two simline 5 1/4" floppy
Screen Format: 40x80x24
Graphics: 320/640x200
Sound: Yes
Colour: Choice
Keyboard: Detachable
Software Included: MS-DOS 2.1
Primary Market: Business or Home
Manufacturer: President Computer Corp.
Available From: President Computer Corp.
Suggested Retail: \$2595.00 including monochrome monitor

Victor Vickie

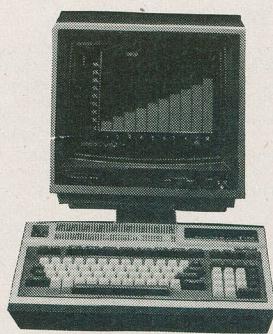
Operating System: 8086
Processor(s): 8086
RAM: 256K
Printer I/O: Disk Drives Inc:
Screen Format: 800x400
Graphics: 800x400
Sound: Yes
Colour: Choice
Keyboard: Detachable
Software Included: BASIC
Primary Market: Business
Manufacturer: Victor Technologies
Available From: Zentronics
Suggested Retail: \$5520.00

Xerox 16/8 Prof. Comp.

Operating System: Supports CP/M-80, CP/M-86 and MS-DOS
Processor(s): 8086 and Z80A
RAM: 128K
Printer I/O: Serial and parallel
Disk Drives Inc: Optional 2 floppy or 1 hard, 1 floppy 80x24
Screen Format: Optional
Graphics: No
Sound: No
Colour: Detachable
Keyboard: BASIC
Software Included: Business
Primary Market: Xerox
Manufacturer: Xerox Stores
Available From: Xerox Stores
Suggested Retail: \$5595.00 SS drives; \$6795.00 DS drives

Timex Sinclair 1000

Operating System: BASIC
Processor(s): Z80
RAM: 2K
Printer I/O: ZX Printer interface
Disk Drives Inc: Cassette based
Screen Format: 32x16
Graphics: 32 graphic characters
Sound: No
Colour: No
Keyboard: Integrated
Software Included: BASIC
Primary Market: Home
Manufacturer: Timex
Available From: Gladstone Electronics
Suggested Retail: \$39.95



Toshiba T-100

Operating System: CPM
Processor(s): Z80A
RAM: 64K
Printer I/O: Serial and parallel
Disk Drives Inc: Two 5 1/4" DS DD floppy
Screen Format: 80x25
Graphics: 640x200 pixels
Sound: No
Colour: Optional
Keyboard: Detachable
Software Included: Two BASICs, spreadsheet, word processor, database
Primary Market: Business
Manufacturer: Toshiba
Available From: Irwin Electronics
Suggested Retail: N/A

Visual Computer

Operating System: MS-DOS
Processor(s): 8088
RAM: 256K
Printer I/O: One parallel, one serial
Disk Drives Inc: Two 360K 5 1/4" floppy
Screen Format: 80x16/25 LCD
Graphics: N/A
Sound: Yes
Colour: Yes
Keyboard: Detachable
Software Included: MS-DOS 2.1, GWBASIC
Primary Market: Business
Manufacturer: Visual Computer Incorporated
Available From: Nelma Data Limited
Suggested Retail: \$4495.00

Winner

Operating System: BASIC
Processor(s): 6502 and Z80A
RAM: 76K
Printer I/O: Serial
Disk Drives Inc: Optional 5 1/4" floppy
Screen Format: 40x80x24
Graphics: 280x192 pixels
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: BASIC
Primary Market: Business or home
Manufacturer: Orion
Available From: Orion Electronics
Suggested Retail: \$995.00

Xerox 1810

Operating System: CP/M
Processor(s): Proprietary
RAM: 64K
Printer I/O: Serial and parallel
Disk Drives Inc: Cassette built-in
Screen Format: 80x3
Graphics: Yes
Sound: Yes
Colour: No
Keyboard: Integrated
Software Included: Text Editor, electronic mail
Primary Market: Business
Manufacturer: Xerox
Available From: The Xerox Store
Suggested Retail: \$2495.00

Zenith ZF 111-32/ZFG 121-32

Operating System: Choice
8088 and 8085
Processor(s): 128K
RAM: Two serial and one parallel
One DS DD 5 1/4" floppy
Disk Drives Inc: 80x24
Screen Format: 640x225 pixels
Graphics: No
Sound: Optional
Colour: Integrated
Keyboard: CP/M or ZDOS
Software Included: Business
Primary Market: Zenith
Manufacturer: Local dealers
Available From: \$5500.00 (no monitor); \$5600.00 with green monitor

Zenith ZFA 161-21/ZF 151-21

Operating System: MS-DOS
Processor(s): 8088
RAM: 128K
Printer I/O: Two serial, one parallel
One or two 5 1/4" DS DD floppy
Disk Drives Inc: 80x25
Screen Format: 640x200 pixels
Graphics: Yes
Sound: Optional
Colour: Detachable
Keyboard: MS-DOS, diagnostics
Software Included: Business
Primary Market: Zenith
Manufacturer: Heathkit-Zenith
Available From: \$3600.00 including 9" monitor;
Suggested Retail: \$3300.00 (desktop)

Zeus 2001

Operating System: Variable
Processor(s): 6502
RAM: 64K
Printer I/O: Optional serial or parallel
Disk Drives Inc: Optional 5 1/4" floppy
Screen Format: 40x24
Graphics: 280x192 pixels
Sound: Yes
Colour: Yes
Keyboard: Integrated
Software Included: Variable; user's choice
Primary Market: Business or home
Manufacturer: Arcomp Micro Systems
Available From: Chen Koll Enterprises
Suggested Retail: \$429.00

Moorshead Publications Software Services

Stockboy Inventory Control Package

When we first advertised this program, we would have been pleased with a fraction of the orders we received. On reflection we should have appreciated what a bargain it is. Inventory programs are generally pretty expensive and some of them are inflexible and some even badly engineered. You may find that even small inventories generate enormous files.

Stockboy is a good, powerful, flexible bargain-priced package which will handle inventory for small businesses. We use Stockboy within Moorshead Publications for our own inventory control and it has stood the test of time.

Stockboy can:

- Maintain an inventory database with current, maximum and minimum stock reporting when an item needs re-ordering.
- Be a point of sale terminal, adjusting the stock data base on line.
- Produce individual packing lists.
- Generate a customer list to be used in mass mailings.
- Run on any CP/M or MS-DOS based computer, even an Apple II running with a softcard.

Stockboy is written in Microsoft BASIC, and is designed to be easily altered to suit your needs. It can be compiled using BASCOM if you desire. It is designed for use by non-technical operators.

Available for: CP/M and PC formats

\$29.95 most systems **\$34.95** for 8"

Ontario residents add 7% PST.

Apple Wordstar Fixer

Apples and Wordstar are not entirely friendly. Apple compatible systems equipped with Videx type eighty-column cards do a number of unpleasant things to this popular word processor. While there are simple cures for this... they all involve some delicate code hacking.

The Fixer solves this problem. Place it on the same disk as your copy of WS.COM, type FIXER and after a suitable amount of disk noise, you will have APWS.COM on there too. This version of Wordstar includes special patching and unhooking code which runs each time you boot Wordstar, and makes your fruit behave as it should. It releases the control K's, translates the left arrow key to a delete character, and patches Unitoron keyboards.

In addition, the fixer allows you to set some of the defaults of Wordstar which the MicroPro INSTALL package doesn't really get to. All of these features are menu driven in English for absolute non-technical operation.

Will run in either 44K or 56K CP/M.

Available for:
Apple II + CP/M only. **\$19.95**

Ontario Residents add 7% P.S.T.

Formats

Where CP/M is shown, the following formats are available:

Apple II + CP/M (see below)
Access Matrix, Morrow Micro Decision, Superbrain, Xerox/Cromemco*, Epsom QX-10VD, Sanyo MBC1000, Neima Persona, Kaypro II, Osborne Single Density*, Osborne Double Density, Systel/Olympia, 3R Avatar, Attache, Televideo, Lobo Max-80*, DEC VT-180, Casio FP-1000, Micromate, Zorba, 8 inch SSSD*

*Software marked with an asterisk is the higher price quoted.

MDM730 for the Apple II + CP/M requires two disks and is at the higher price.

PC

Available for the IBM PC and genuine compatibles.

AppleDOS

For Apple II + and genuine compatible systems.

TRS-80 Model II CP/M

Will operate under either Lifeboat or Pickles and Trout CP/M.

Gemini WordStar PRESS

The WordStar printing function is agonizingly slow. It's also not very obliging in regards to where it puts its page numbers and things like headers.

PRESS is a utility which handles the formatted printing of all sorts of text files, be they manuscripts, drafts, program listings... anything that you'd normally want printed out in page form. It installs the header of your choice at the top of each page and slaps the page number beside it.

It also gives you a running count of the number of characters, lines and pages having hit the printer as you go. It allows you to have your documents printed out in a variety of type size and style permutations, commensurate with the capabilities of your printer.

Most important, however, PRESS will send text to your printer, formatted and all, as fast as your printer can accept it. It will even adjust the high bits of WordStar files to avoid selecting the Sanskrit character set.

PRESS comes configured for the Gemini 10X and 15X printers. It will, in fact, be quite happy with most Epson compatible dot matrix printers. A version is also supplied for use with letter quality daisy wheel printers.

PRESS is a simple to use package which communicates with you in plain English.

Available for: CP/M

\$19.95

Ontario Residents add 7% PST.

Steve's CP/M Wunderdisk! Volume the First

In the course of doing the last year or so of Computing Now! we've generated a lot of code. We've collected all the programs we've written... some of which have never been published in any of our magazines... and put 'em all on one disk. Included are things like STAR, the Gemini 10 printer setup, the Last Wordstar Unhook, CPMAP and the CP/M HOST program, complete with several unreleased support programs.

The Wunderdisk is the best collection of tricky CP/M routines on the planet, ideal for anyone who wants to get inside this powerful operating system and sing. It's also the best documented... the programs, for the most part, are written up in issues of Computing Now!

The Wunderdisk is available for: CP/M **\$19.95**

Ontario Residents add 7% PST.

**Software Services,
Moorshead Publications
25 Overlea Boulevard, Suite 601
Toronto, Ont. M4H 1B1**
Phone Orders and Major Credit Cards Accepted



AppleTM is a registered trademark of
Apple Computers Inc.

Catalogues Available

MICROPROCESSORS

64K standard	\$456.75
64K/n.k.p.	\$471.45
Apple IIe compat	\$699.00
standard keyboard	\$ 79.00
keyboard/n.k.p.	\$ 89.00
48K motherboards	\$288.70
64K motherboards	\$307.91
power supply (EPB)	\$ 75.95
power supply (CSA)	\$ 89.95
assembled unit/no n.k.p.	\$194.90
assembled unit/n.k.p.	\$214.90
assembled unit (CSA)	CALL

MONITORS

AMDEK green	\$149.95
AMDEK amber	\$159.95

PERIPHERALS

disk drive I/F	\$ 49.95
parallel printer I/F	\$ 54.95
80 col (manual) II + II +	\$ 78.69
80 col (auto) II + II +	\$ 83.95
80 col. Ile	CALL
est. 80 col. 64K Ile	\$139.00
eprom writer	\$ 69.95
Z-80 (soft) CP/M	\$ 51.75
printer buffer 16K ex 64K	\$149.60
micro buffer 32K	\$156.20
grappler	\$ 69.30
integer	\$ 55.55
16K RAM w/cable	\$ 54.25
128K RAM	\$236.50
16K language	\$ 60.50
speech	\$ 55.00
RS232S (serial)	\$ 49.50
RS232C (comm.)	\$125.40
RS232S (super)	\$134.20
modem II	\$142.50

DISK DRIVES

Shugart SA-390	\$239.95
Chinon C-40	\$254.95
SA-390 for Ile	\$259.95
C-40 for Ile	\$274.95

PRINTERS

CPA80 parallel	\$389.95
Panasonic EN-1091	\$529.00

ACCESSORIES

64K RAM kit (9 chips)	\$ 50.00
4164-150 ns memory chips	\$ 6.00
data disk bank	\$ 15.95
RF mod	\$ 14.95
RF mod with sound	\$ 19.95
cooling fan w/surge protector	\$ 37.48
in-line surge protector	\$ 19.95
power bar	\$ 22.95
joystick for II, II +, Ile (inside)	\$ 34.95
joystick for all Apples & IBM	\$ 44.95
monitor tilt stand	\$ 25.95

● IF WE DON'T LIST IT ● ASK FOR IT ●

We accept Certified Cheques, Money Orders, Bank Transfers, VISA, MasterCard, Diners Club, American Express, and American Express. VISA and MasterCard add 3%. Cheques require bank clearance. All orders shipped Freight Collect. All subject to availability, acceptance and verification.

All sales final. Prices subject to change without notice. Orders normally shipped within 48 hours of payment.

Shop Around And Compare

"Where Customers Send Their Friends"
dana's computer discount, P.O. Box 6295, Station C, Edmonton, Alberta Canada, T5B 4K6 Tel: (403) 429-4718

Survey of 200 Computers

Addresses: Ace Micro-Electronics Corporation, 106-11511 Bridgeport Road, Richmond, British Columbia V6X 1T4 (604) 276-8214 • AFTEK Business Machines Incorporated, 762 Gordon Baker Road, Willowdale, Ontario M2H 3B4 (416) 497-0531 • Apple Canada Incorporated, 875 Don Mills Road, Don Mills, Ontario M3C 1V9 (416) 444-2531 • Blue Chip Computers, 24 Bayswater Avenue, Ottawa, Ontario K1Y 2E4 • Coleco (Canada) Limited, 4000 St-Ambroise, Montreal, Quebec H4C 2C8 • Commodore Business Machines Limited, 3370 Pharmacy Avenue, Agincourt, Ontario M1W 2K4 (416) 499-4292 • Computech Micro Design, 994 Westport Crescent, Unit A5, Mississauga, Ontario L5T 1G1 (416) 673-3300 • Computer Parts Galore Inc., 316 College Street, Toronto, Ontario M5T 1S3 (416) 925-8291 • ComputerLand, 3761 Victoria Park Avenue, #5, Scarborough, Ontario M1W 2S6 (416) 497-5722 • Computron, 17507-107 Avenue, Edmonton, Alberta T5S 1E5 (403) 489-8400 • Data General (Canada) Incorporated, 2155 Learne Blvd., Mississauga, Ontario L5K 2K8 (416) 823-7830 • Datacalc Technology Industries Corporation, 224 Slater Road, Cranbrook, British Columbia (604) 489-5343 • Datamex, 115 Norfinch Drive, Downsview, Ontario M3N 1W8 (416) 665-1808 • Datapoint Canada Incorporated, 4881 Yonge Street, Suite 700, Willowdale, Ontario M2N 5X3 (416) 222-8005 • DataTech Systems Limited, 135-5665 Kingsway, Burnaby, British Columbia V5H 2G4 (604) 437-3751 • Digital Equipment Company, 165 Attwell Drive, Rexdale, Ontario M9W 595 (416) 675-2580 • DY-4 Systems Inc., 888 Lady Ellen Place, Ottawa, Ontario K1Z 5M1 (613) 728-3711 • Electronic Control Systems, 1590 Matheson Blvd., Mississauga, Ontario L4W 1J1 (416) 625-8036 • Electronic Distributors (Canada), #100-107711 Gambie Road, Richmond, British Columbia V6X 3C9 (604) 270-7811 • Electronic Distributors Incorporated, 3950 Chesswood Drive, Downsview, Ontario M3J 2W6 (416) 636-9404 • Ericsson Communications Incorporated, 1799 Argentia Road, Mississauga, Ontario L5N 3B1 (416) 821-9420 • Exceltronix Inc., 319 College Street, Toronto, Ontario M5T 1S2 (416) 921-8941 • Gladstone Electronics, 1736 Avenue Road, Toronto, Ontario M5M 3Y7 (416) 787-1448 • Golden Maple Leaf Computer Systems Limited, 31 Portland Street, Toronto, Ontario M5V 2V9 (416) 593-6280 • Heathkit-Zenith, 1020 Islington Avenue, Toronto, Ontario M8Z 5X5 (416) 231-4171 • Hewlett-Packard, 6877 Goreway Drive, Mississauga, Ontario L4V 1M8 (416) 678-9340 • HiTECH Computer Systems, 4648-99th Street, Edmonton, Alberta T6E 5H5 (403) 437-0196 • IBM Canada Limited, 3500 Steeles Avenue East, Markham, Ontario L3R 2Z1 (416) 474-2053 • Irwin Electronics, 165 North Queen Street, Etobicoke, Ontario M9C 1A7 (416) 626-6600 • Infinite Canada, Inc., 785 Plymouth, Suite 123, Mont-Royal, Quebec H4P 1B3 (514) 342-6454 • JLS Electronics, 2026 Yonge Street, Toronto, Ontario • Lanpar, 85 Torbay Road, Markham, Ontario L3R 1G7 (416) 475-9123 • Leading Source (Division of Lanpar) - See Lanpar • Micos Computer Systems Incorporated, 1295 Eglinton Avenue East, Mississauga, Ontario L4W 3E6 (416) 624-0320 • Micro Computers of Canada Inc., 3410 Midland Avenue, Unit #4, Scarborough, Ontario M1V 2N1 (416) 293-3885 • Micro-Lewis/Compaq Corporation, 895 Don Mills Road, Don Mills, Ontario M3C 1W3 (416) 449-8741 • Neilsen Computers, Inc., 275 Lancaster Street West, Kitchener, Ontario N2H 4V2 (519) 743-1830 • Nelma Data Corporation, 5170-A

Timberlea, Cooksville, Ontario (416) 624-0334 • Norango Computer Systems Inc., 2025 Sheppard Avenue East, Willowdale, Ontario M2J 1V7 (416) 498-5332 • NSN Options Limited, 250 Wyecroft Road, Unit 11, Oakville, Ontario L6K 3T7 (416) 842-6530 • Office Equipment, 525 Denison, Markham, Ontario (416) 491-9330 • Ogivar Inc., 958 Montee de Liesse, Ville St. Laurent, Quebec H4T 1N8 (514) 334-3642 • Olivetti Canada Limited, 1390 Don Mills Road, Don Mills, Ontario M3B 2X3 (416) 447-3351 • Olympia Business Machines Canada Limited, 58 Prince Andrew Place, Don Mills, Ontario M3C 3A2 (416) 445-4212 • Pacific Rim Electronic Imports, Inc., 13439-111 Street, Edmonton, Alberta T5E 4Z7 (403) 475-0555 • Panasonic Office Automation, 5770 Ambler Drive, Mississauga, Ontario L4W 2T3 (416) 624-5010 • Peach Microcentre, 110 O'Connor Street, Ottawa, Ontario K1P 5M9 (613) 594-4721 • Peripherals Plus, 350 des Erables, Lachine, Quebec H8S 2P9 (514) 364-5554 • Philips Information Systems, 1200 Sheppard Avenue East, Willowdale, Ontario M2K 2S5 (416) 494-8111 • President Computer Corporation, 540 Gordon Baker Road, Willowdale, Ontario M2H 3B4 (416) 492-1455 • Radio Shack, 279 Bayview Drive, Barrie, Ontario L4M 4W5 • Robin Hood Electronics, 20 Strathearn Avenue, Brampton, Ontario L6T 4P7 (416) 791-0025 • ROLM Canada Incorporated, 4 Lansing Square, Willowdale, Ontario M2J 1T1 • Sanyo Canada Inc., Business Systems Division, 50 Beth Nealon Drive, Toronto, Ontario M4H 1M6 • Scarsdale Technologies, Incorporated, 23 Prince Andrew Place, Don Mills, Ontario M3C 2H2 (416) 441-1900 • SC Time Canada, 3900 Victoria Park Avenue, Willowdale, Ontario M2H 3P3 (416) 496-2221 • Semi-Tech Microelectronics Corporation, 390 Steelcase Road East, Units 7 and 8, Markham, Ontario L3R 1G2 (416) 475-2670 • Sharp Electronics of Canada Limited, 116 Galaxy Boulevard, Rexdale, Ontario M9W 4Y6 (416) 675-7244 • Sony of Canada Limited, Communications Products Division, 411 Gordon Baker Road, Willowdale, Ontario M2H 2S6 (416) 499-1414 • Spectravideo Canada, 2913 Lakeshore Boulevard West, Toronto, Ontario M8V 1J3 (416) 252-4550 • Sperry Inc. Computer Systems, 55 City Centre Drive, Mississauga, Ontario L5B 1M4 (416) 270-3030 • SGV Marketing, 1520 Trinity Drive, Unit 16, Mississauga, Ontario L5T 1T6 (416) 673-2323 • TEO Computers and Peripherals, Inc., 275 Steelcase Road East, Markham, Ontario L3R 1G3 (416) 474-9372 • Texas Instruments, Inc., 280 Centre Street East, Richmond Hill, Ontario L4C 1B1 (416) 884-9181 • Tithes Business Systems (Canada) Incorporated, 971 West Broadway, Vancouver, British Columbia V5Z 1K3 (604) 733-8999 • Total Office Systems Limited, 1050 McNicoll Avenue, Unit 14, Scarborough, Ontario M1W 2L8 (416) 493-3575 • Xerox Store, 703 Don Mills Road, Don Mills, Ontario M3C 1S2 • Zentronics, 8 Tilbury Road, Brampton, Ontario L6T 3T4 (416) 451-9600

NOW... Software YOU control

Industrial Strength Software for Business

A unique new software that is powerful, flexible and easy to learn and use. Intuit's power is controlled by just 22 functions clearly labelled on your computer keyboard. On IBM-PC® and compatibles, each of the function keys has just two unchanging uses. You can move freely between activities with the press of a key. And, for all its simplicity, INTUIT packs the power of comparable stand-alone software.

Directory & File Management

- Multi-level, hierarchical directories • Long multi-word file names to 67 characters
- Directories up to 4,000 entries • Files easily renamed, copied and moved throughout the directory system • Directories can be sorted
- Directory system capable of organizing and managing all disk resources of a typical computer

Text Editing

- User selectable word wrap • Search plus Search and Replace • Insert line and character • Delete line and character • Block move, copy, print, sort, and delete • Horizontal and vertical scrolling
- Direct positioning to any location in document

Text Formatting

- Automatic pagination • Automatic chapter, section, paragraph, subparagraph and list numbering in several styles
- Titles and text of chapters, sections, paragraphs, subparagraphs and lists automatically formatted, indented or centered and spaced
- Underlining, boldface, superscript and subscript • Formats remain with documents when moved or copied

Records (Database)

- Up to 65 alpha-numeric or numeric fields per record
- Sortable on any two fields • True numeric sorts on numeric fields
- Multi-field find specifications with full logic
- Additional fields, up to 65 field limit, can be appended to original file • Easy file configuration • Field names and sizes can be changed • Multi-file merges with special applications

INTUIT is another special product which impressed us at Moorshead Publications so much that we have made special arrangements to supply our readers directly. In mid-1985 it will be available in major stores but until then it is exclusively available from Moorshead Publications.

What the Experts Say ...

"... extremely simple and powerful to use . . .
WHOLE EARTH SOFTWARE CATALOGUE

"In our testing we could not make 'Intuit' misbehave in any manner, despite our best efforts."
INFOWORLD

"Some of the concepts implemented by 'Intuit' are nothing short of amazing."
SOFTWARE NOW!

Applications

Standard applications providing utilities for full volume directory listings, disk formatting, file merging, multi-file printing and others • Future add-on applications include screen and plotter business graphics, communications, spelling checker, table of contents generator

Integration

With the INTUIT system, everything can be copied to text and between subjects of like type. Almost everything else is copyable from place to place where this does not destroy the original meaning of the information. Information can also be copied between INTUIT and MSDOS® disks, allowing interchange of textual information between other programs and INTUIT.



TO: MOORSHEAD PUBLICATIONS
25 Overlea Blvd., Suite 601, Toronto, Ontario M4H 1B1

Please send me by 1st class registered mail:

Qty.	Price	Total
1	\$149.95	\$7.50

INTUIT
Shipping and Handling
Ontario Residents add 7% PST
 I enclose my cheque/money order payable to Moorshead Publications
Charge to my: Mastercard Visa American Express
Card No. _____ Expiry Date _____
Offer expires May 31, 1985

Tables (Spreadsheet)

200 rows by 65 columns or 65 rows by 200 columns user selectable and not dependent on memory size • English language command format • Rows, Columns and Cells can be referenced by multi-word names or by numeric coordinates • Named procedures allow user to create customized commands • Thirty verbs including loops and conditionals • Direct entry of numbers into cells with automatic comma formatting for large numbers • Flexible formatting including percent signs, dollar signs, brackets for negative amounts and underlines

Forms

Free format screen layouts for entry and printing of database records • Flexible report generation and mail merge • Computed numeric fields • Text formatting within forms • supports multi-page reports and letters • Sort, find, and selected item printing within forms

Other Features

Four function memory calculator can be used anywhere • Easy note taking • Full screen explanations at the press of a key • Full screen error messages at user's request

Hardware

IBM PC® or XT plus most IBM compatibles with at least one floppy disk and 256 KB of RAM memory • INTUIT supports fully configured systems yet runs without limitation on a minimum system • Winchester disk fully supported on the IBM XT • Both monochrome and colour displays supported • Both serial and parallel ports supported.

Exclusive Canadian Distributor:
Computron

Edmonton • Toronto

If for any reason you are not completely satisfied with INTUIT, return it in good condition within seven days and we will refund your money in full without question (shipping charges excepted).

Name (Mr/Mrs./Miss/Ms.)
(Please Print)

Address

City

Prov. _____ Postal Code _____

We will have a limited number of INTUIT Available at our Toronto offices for pickup orders. Please call first to ensure counter stock is available.

Exceltronix

Spring 1985 Catalogue "You can't beat the best."



**319 College Street, Toronto,
Ontario M5T 1S2 (416) 921-8941**

**Ottawa: 217 Bank Street (613) 230-9000
Hamilton: 72 James St. N.**

Pickup Counter
(\$25.00 min). Plenty of
parking: Rear of
335 Evans Ave., Toronto
(QEW and Kipling)

Mall Orders to
319 College Street,
Toronto, Ont. M5T 1S2

Phone Orders

Local (416) 252-5285
only if busy: (416) 921-8941
Long distance orders 1-800-268-3798
(operators on 800 number cannot handle
enquiries other than orders.)



Components & Computing Inc.

We also accept phone orders: (416) 252-5285, if busy (416) 921-8941 Check our advertisements monthly in Electronics Today and Computing Now! Magazines. Long distance (orders only) 1-800-268-3798.

Name _____

Address _____

City _____ Prov _____

Date _____

QTY **Description**

Order Form

Mail Orders to Exceltronix,
319 College St., Toronto, Ont.,
M5T 1S2

All non-certified cheques will be held for 10 working days for clearance before orders are shipped. Ontario residents must add PST unless proper exemption certificates are supplied with order. All prices and specifications subject to change without notice. No returns accepted without prior written consent of Shipping Dept. manager. A 15% restocking charge will be applied to all returned items. Returns will be refused unless prior written RMA# (approval) is obtained from the mail order manager. RMA# must appear on package.

Price Each **Total Price**

Total for goods (Minimum \$10.00) _____
 Shipping (Minimum \$5 — see below)* _____
 Ontario Residents add 7% PST _____
 Adjustments _____
 Total _____

*Shipping: Minimum \$5 which includes handling and insurance. Items are shipped UPS or other suitable carrier. Shipping costs are dependent on weight and destination, if you are unsure contact our Mail Order Department.

Payment: Cheque Money Order Credit Card. Do NOT send cash.

We accept Visa, Mastercard, American Express and Diner's Club Credit Cards

() Visa () Mastercard () American Express () Diner's Club

Card No. Expiry Date Signature

All prices are in Canadian funds, FST included

Please feel free to photocopy this order form

Exceltronix

Components & Computing Inc.

A successful, rapidly expanding all-Canadian company committed to high technology.

Founded in 1979 by Eugen Hutka, the Exceltronix group has grown to sales approaching \$9 million a year with four retail branches, the original (but much expanded) one at 319 College Street in Toronto, 335 Evans Avenue also in Toronto and with Branches in Ottawa and Hamilton.

From a retail store specializing in electronic parts, Exceltronix is now only one of a group of companies, all controlled by Eugen Hutka.

Activities range from original research and development (almost \$1 million was devoted solely to this last year), to manufacturing, to retailing and mail order.

Multiflex Inventions and Technologies Inc. are major suppliers to Canadian industry: the advanced message display signs in the Toronto Subway system were designed by Multiflex and manufactured by Versa-Digital Inc. and similar systems are in use with VIA Rail. Multiflex and associated companies do custom design, development and manufacture for all types of customers, including Northern Telecom, CGE and Bombardier. Currently we are working on the signs system for the Vancouver ALRT (Advanced Light Rapid Transit).

Despite its phenomenal growth, Exceltronix has not forgotten what led to this success: personal service, and competitive prices. The same company who are mass producing IBM and Apple compatible peripheral cards will still sell you a single resistor if that is what you want.

Exceltronix and its sister organizations are proud, expanding, all-Canadian companies.

Associated Companies:

Exceltronix Inc.

Multiflex Inventions and Technologies Inc.

BEST Computers of Canada Inc.

Toronto Computing Centre Inc.

Versa-Digital Technology Inc.

Digi media Inc.

XL Electronix Computer Music Centre

Exceltronix Spring Catalogue 1985 — 3



Eugen Hutka still takes an active interest in all aspects of the company's business and is seen here inspecting products on the production line.



The display signs used through the Toronto subway system are products developed and produced by Multiflex and Versa-Digital.



The Hamilton branch of Exceltronix opened in 1984. There is also a similar sized stored in Ottawa.



Almost all products are flow soldered and ultrasonically cleaned in Multiflex's 5,000 square feet production facilities.

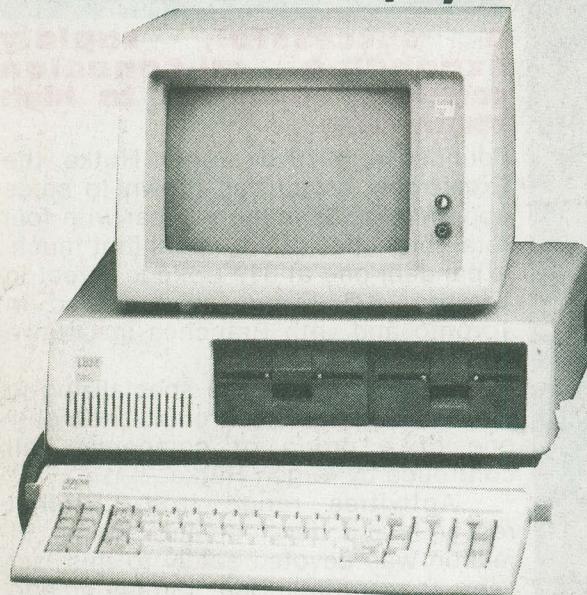


Almost \$1 million was spent last year by the group on research and development of new products.



Exceltronix

IBM PC — \$2,695.00



Includes

- 256K RAM
- 40KB - ROM, self test
- One 360 KB diskette drive
- High Speed 16 bit microprocessor, (8088).
- Operating system 2.10, UCSD P-System & CP/M 86.
- Floppy controller
- Keyboard
- Five expansion slots

IBM XT — \$5,895.00

Includes

- (1) IBM 10 Meg Hard Drive
- (1) IBM 360 KB Disk Drive
- Async adapter & Keyboard
- 128KB RAM
- 40KB ROM
- 8 expansion slots
- IBM DOS 2.10

IBM Personal Computer

AT System

Basic Model	.....	\$Call
Enhanced Model	.....	\$Call
IBM Monitor	.....	\$429.00
IBM Mono Card	.....	\$389.00

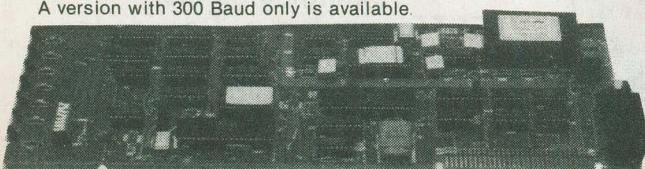
BEST MODEM

The BEST modem is a smart 1200/300 direct connect modem. It can either be a stand-alone unit in which case it requires a small wall adaptor, or it plugs in one of the IBM slots. When used as a stand-alone unit, the modem looks like a Hayes 1200 Smart Modem, that is, it emulates the same instruction set. When it is used in the IBM, it looks like an intelligent serial communications port which also supports a super-set of the Hayes instruction set.

The modem supports auto-dial, auto-answer, and auto-speed select directly from software control. The modem also has a speaker so that aural monitoring of the call is possible. There are also LED monitors so that the state of the modem can always be known. These LEDs are: Modem Ready, Auto-Answer enabled, Carrier Detected, Transmitting, Receiving, Data Set ready.

Software packages such as Crosstalk, PC-talk, and Hayes' Smartcom II also will run with this modem.

A version with 300 Baud only is available.



300 Baud **\$179.00** 300/1200 Baud **\$379.00**

Phone Orders: Local (416) 252-5285, Long Distance (orders only) 1-800-268-3798

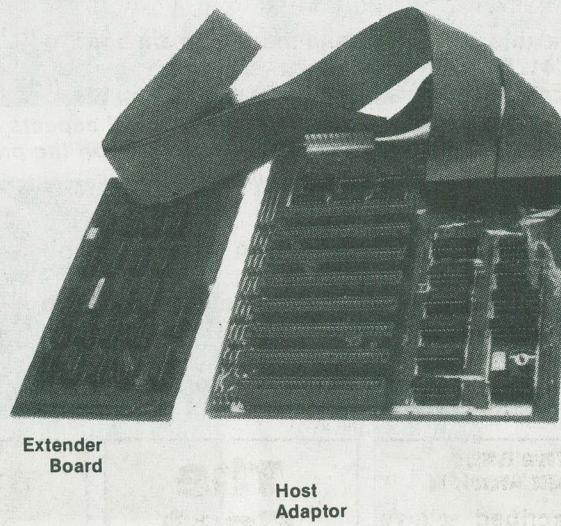
**EXPANSION SYSTEM
for your IBM PC**

- Adds 8 extra slots to your IBM.
- Allows you to convert an IBM PC into a 10 Meg or 20 Meg. Hard Disk System with lots of memory and Tape Drive.
- Designed to sit beside or under your IBM PC (connected by ribbon cable).
- Comes with its own powerful 150W power supply and ventilation fan.
- Attractively packaged in an IBM styled case
- Host adaptor plugs into your IBM PC

The BEST expansion system consist of two boards, the extender card and the receiver/host card. The receiver/host card is mounted in a new chassis with a 150W power supply and room for 4 slimline drives (floppy or hard).

The extender card resides in your host IBM machine. The purpose of this card is to buffer the system bus for transmission along a 62 wire cable to the host card. The host card then receives the signals and regenerates the bus. The extender card also has onboard diagnostic hardware which is activated on each power up to ensure integrity of the expansion system.

The Expansion System comes in an attractive IBM style case but we show it here in a more interesting form: naked!



Extender Board

Host Adaptor

The host/receiver card resides in a new chassis external to your IBM machine. This board receives signals sent by the extender card and regenerates the standard IBM bus. The host board provides another 8 slots on the bus for greater expansion than a single IBM machine could give. The host board is powered by a powerful 150W power supply independent of your host machine, thus providing enough power for additional disk drives or expansion boards.

Complete with power supply, boards and cables . **\$599.00**
With 10 Meg Hard Drive **\$1595.00**

IBM is a registered trademark of IBM Canada Ltd.

**See our advertising every month
in Electronics Today and
Computing Now! magazines.**

The

BEST

Mark II

**Microcomputer
Superb
IBM PC & XT
Compatibility**

300 day warranty
**Now with many
NEW standard
features**

- Uses 8088 microprocessor.
- **New Feature.** 256K RAM as standard.
- **New Feature.** Comes with the latest 41256 RAM chips.
- Expandable up to 512K and more on main board using 41256 RAM chips.
- **New Feature.** 7 expansion slots, each being identical for the user to upgrade as required.
- **New Feature.** Fitted with 150W power supply so system can be upgraded to a hard disk without changing power supply.
- **New Feature.** Flip-Top case.
- DMA controller. Three of the DMA channels are available to the user.
- **New Feature.** Even most basic versions come with Parallel and Serial Ports and Real Time Clock.
- Half watt speaker.
- Pre-socketed for optional coprocessors such as the 8087 math processor.



- Keyboard Interface compatible with IBM compatible keyboards through a 5-pin DIN connector.
- Three ROM sockets are available to the user, one generally holding the Phoenix BIOS.
- **New Feature.** Reset switch.
- Timer/Counter used by the system for Real Time Clock, time base and for tone generation.
- Complete with the Phoenix BIOS, identical to that used by many of the large US companies manufacturing IBM compatible computers.
- Comes with two Slimline DS, DD 5 1/4" 360K Disk Drives.
- Colour Video (RGB and composite) and Disk Controller cards included.
- 230V models available.
- 300 Day warranty.

Tape Drive option backup suitable for all systems

Call

**The BEST
256K Mark II**

As described above with 256K memory (using 41256 chips), Two 360K DS, DD disk drives, RS232 and parallel port, Real Time Clock, 7 slots, Phoenix BIOS, Colour Video and Disk Controller Cards, Keyboard and much, much more.

\$1759

**The
Best
512K
Mark II**

As 256K Mark II but with 512K on board

\$1949

**The BEST
10 Meg
Hard Drive
Mark II**

As 256K Mark II but with 10 Meg Hard Drive (Supplied with one Floppy Drive. For second drive add \$200).

\$2695

**The BEST
10 Meg/512K
Mark II**

As 256K Mark II but with 10 Meg Hard Drive and 512K on board. (Supplied with one Floppy Drive. For second drive add \$200).

\$2895

**The BEST
20 Meg/512K
Mark II**

As 256K Mark II but with 20 Meg Hard Drive with 512K on board. (Supplied with one Floppy Drive. For second drive add \$200).

\$3395

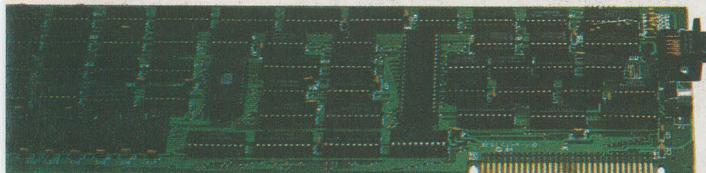


Designed, manufactured,
warranted, serviced and
supported by our group of
companies here in Canada.

Please Note: Don't be put off by our spectacularly low price; this is due to the fact we do not deal with middlemen and our volume buying power of parts. All BESTs are manufactured in Canada to the highest quality standards using prime, guaranteed components by our sister company. All systems pretested (burnt-in) for about 48 hours before shipping. Hundreds of happy customers report excellent reliability and compatibility.

IBM Compatible Boards

COLOUR GRAPHICS VIDEO BOARD \$179.00



This board was designed to be compatible with a wide variety of display systems. Two types of output connectors are provided: 1) composite baseband video 2) direct RGB drive (9 pin D-shell Connector). In addition a light pen port is provided. It must be stressed that this card can be used in black and white with comparable resolution to that of the black and white board. Thus a low cost black and white monitor could be used in place of the more expensive colour monitor without loss of performance (of course colour cannot be achieved on a black and white monitor).

There are 4 modes of supported operation (more are available but the user must write his own software): low resolution graphics, high resolution graphics, low resolution alphanumeric, and high resolution alphanumeric. In the low resolution modes colour is available in a variety of foreground/ background/overscan colours. In high res. there is only black and white available, this is due to the video memory limitation.

GRAPHICS

LOW RESOLUTION:

In low res. graphics the screen is memory mapped into 320 PELS by 200 rows. Each PEL may have one of four colours. The background colour may be one of 16 possible colours the other three may be one of two selectable palettes, namely green/red/brown or cyan/magenta/white.

HIGH RESOLUTION:

In this mode all of the memory is mapped to the screen, thus only black and white is available. In high res. there are 640 PELS by 200 rows, twice that of low res.

ALPHANUMERIC

In both low and high res. alphanumeric mode the characters are generated via an eprom, thus special characters are easily implemented. In addition, it is possible for the user to specify the location of his own eprom external to the video board and be able to utilize both eproms for character generation.

LOW RESOLUTION:

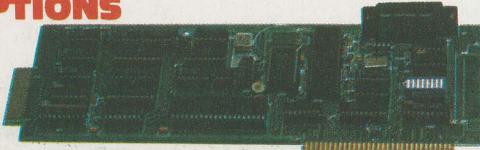
Low res. is characterized by 40 columns by 25 rows of characters. Each character is composed of an 8x8 dot matrix. The characters are enclosed in a 7x7 matrix within this box, with 1 line for descenders. Sixteen foreground colours are supported and 8 background colours are available. In addition, blinking of individual characters is also available.

HIGH RESOLUTION:

High res. supports the standard 80x25 character matrix for high bandwidth monitors. Because all of the memory is used to display characters, colour is not available, however high res. supports the following on a per character basis: reverse video, blinking and highlighting.

FLOPPY CONTROLLER BOARD AND OPTIONS

Also see page 8 for New floppy controller



This board actually contains three separate units, one being standard and the other two being options. The standard unit is the floppy controller card. The options being the asynchronous serial interface and the other being a real time clock with battery backup.

FLOPPY DISK CONTROLLER: \$129.

This controller can control four 5 1/4" floppy disks. Two disks are controlled by an internal daisychained ribbon cable, the other two are connected externally through the back panel via a connector. The controller is based on the NEC Upd 765 or Intel 8272 chip and can control double density/double sided floppy disks, thus giving a formatted capacity of about 320K bytes per drive. The card uses the main boards interrupt and DMA capabilities to improve performance. The board also features write precompensation and digital phase lock loops for "solid" reliability.

ASYNCHRONOUS COMMUNICATIONS OPTION \$39.

Communication is achieved through one of two means: standard RS232 protocol or though a 20mA current loop.

The transmission speed is programmable from 50 to 9600 baud, with 5,6,7, or 8 bits per character and 1,1 1/2, or 2 stop bits, any combination is supported. The system is based on the INS8250 chip which also provides the following features in addition to those above:

- full double buffering, eliminating expensive, precise synchronization.
- full modem control functions: CTS, RTS, DSR, DTR, and RI.
- false start bit detection.
- line break generation and detection.

This card interfaces easily to any one of the popular modems as well as being able to fully exploit the capabilities of the 'smart' modems.

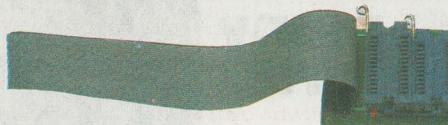
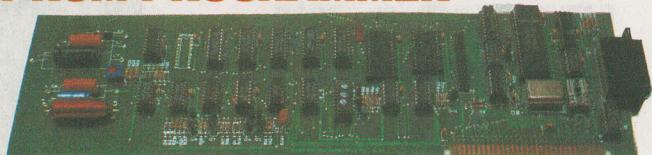
REAL TIME CLOCK: \$39.

This option is based on the MM58274 CMOS chip, thus better backup is easily implemented, this allows continuous time keeping even when the machine is powered down. (Includes real time software).

FLOPPY BOARD including both options above (real time software included) \$189.

(No cables included)

EPROM PROGRAMMER



External Card.

This card can program any one of the following eproms: 2716, 2732, 2732A, 2764, and the new 27128s. Two sockets are available on the adaptor board, one for the 28 pin eproms the other for the 24 pins eproms. These sockets are standard sockets, however as an option ZIF sockets will be inserted. (We recommend ZIF sockets if large number of eproms will be programmed). Also as an option an extension board is available, this board attaches to the adaptor via a ribbon cable and extends out the back panel. This is to allow eproms to be programmed without removing the cabinet cover every time programming is to be performed. Also as a standard feature, the source software is supplied to allow users to modify the programme to suit their needs.

As an option a serial port can be included on the card; this serial port has the same features as the port described with the floppy disk controller (see the floppy disk description for documentation of the serial port).

MAIN EPROM PROGRAMMER CARD (WITH SOFTWARE)

With 2 standard EPROM sockets \$99.00

EPROM PROGRAMMER WITH ZIF SOCKETS (WITH SOFTWARE)

With one 24-pin SIF socket and one 28-pin ZIF socket with provision for serial port. \$139.00

EXTERNAL CARD

Ready to plug into the main EPROM Card (includes one 24-pin and one 28-pin ZIF socket and cable). Saves you from opening the computer each time you want to program your EPROMS. \$69.00

SERIAL OPTION

For your main EPROM programmer. Provides you with a second RS232 serial port. \$49

PARALLEL/GAMES PORT

\$79.00

(cables extra)

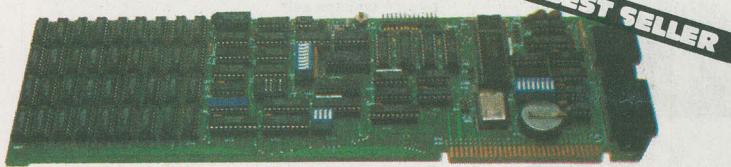


This low cost board allows any IBM compatible printer to be connected to the system. The printer signals are through a DB25 connector and can be connected to many parallel Ideal Printers — Gemini, Epson, TTX printers. This card is not only for printers, but can be used where parallel data must be transmitted from the system. It has 12 TTL output lines which can be written and read under program control. Usually 8 are used for data and the others are used for handshaking with the external device. There is also an interrupt line, which the external hardware can 'tickle' for prompt immediate service. (Such applications as real time data acquisition).

The game port allows 4 paddles or two joysticks to be connected to the system. In fact any variable resistive element could be connected and the software would still give a value proportional to the resistance. This allows industrial applications to be realized easily with existing hardware.

IBM Compatible Boards

The Best 256/512K PENTARAM



BEST SELLER

Memory: Capable of adding up to 256K of memory to your existing system. This card allows 4 boundary selection by means of a dip switch (the boundary locations are 256K, 384K, 512K and 640K). For special applications, other boundaries can be preprogrammed at the factory.

Serial Port: Serial port can be configured on MS DOS standard COM1 or COM2. (For more details, read about the asynchronous communication option on floppy disk controller board on page)

Parallel Port: Supports one of two standard MS DOS printer ports LPT 2 or LPT 3 which are dip switch selectable. (For more information see the description of the parallel game/port card on page)

Game Port: The game port allows 4 paddles or two joysticks to be connected to the system. In fact any variable resistive element could be connected and the software would still give a value proportional to the resistance. This allows industrial applications to be realized easily with existing hardware.

Clock/Calendar Real Time Clock: This option is based on the MM58274 CMOS chip, thus battery backup is easily implemented, this allows continuous time keeping even when the machine is powered down. (Battery back-up and real time software are included).

64K PENTARAM package with all the options . . . \$279.00

256K PENTARAM package with all the options . . . \$359.00

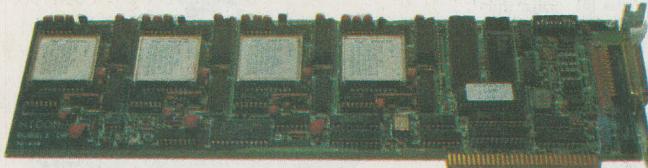
**512K PENTARAM package with all options using
41256-150nS RAM's \$649**

**This is a high quality professional "Best" card at affordable prices
— a hard to beat deal!**

NOTE: this product comes with a 6 month warranty. However, warranty is void if any tampering is done with the board.

BUBBLE MEMORY BOARD

\$2,295.00



These bubble memory boards emulate hard and floppy disks. Each board comes with 512Kb of memory and can be assigned as disk A,B,C,D,E, or F. Also the bubble memory can be configured so that the system can boot from the bubble once it has been formatted. Each board of 512Kb is emulated as 2 floppies with 256Kb each or 1 512Kb hard drive. The software that comes with the package allows the user to configure the system as he requires.

There is also a special mode which allows the user to use the bubble memory as a block access memory peripheral.

ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERSION BOARD

The board contains two separate functions:

- 1) an analog to digital conversion unit
- 2) a digital to analog conversion unit.

The following parts to both functions: both have 12 bit resolution, both have a maximum sampling frequency of 100,000 Hz and both have a hardware queue of 32 samples, i.e., 64 bytes.

The A/D section has 8 inputs which are enabled by the initializing software supplied. If there are 8 inputs being used, then the output stream has 8 interleaved samples. The software supplied will open a file and put the samples in this file. Note however, that it is not possible to write that file to disk since the access time for a floppy disk is too great.

The D/A section has 8 outputs which are again enabled by initializing software. If more than 1 output is used, then the output data must be interleaved (similar to the input). The supplied software will allow the user to specify a file for outputting and the software will take care of the rest.

Note that only the A/D section or the D/A section can be working at the same time.

BEST PROTOTYPING BOARD

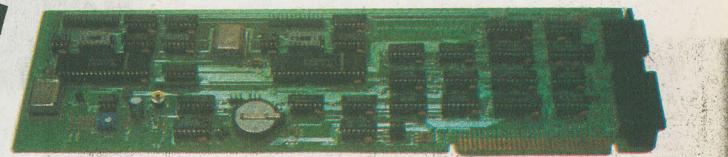
\$28.95

This full length board is a very simple card which allows anyone to design prototypic hardware for his IBM machine. The board is virtually all holes in which to place wirewrap sockets or soldertail sockets. The circuitry provided just decodes the addresses properly so that the board fits into the defined IBM prototyping space. This does not mean that the user is confined to this area alone, since full access is given to the IBM expansion bus.

The Best Quanta Board

\$179.00

with all options shown below



This BEST peripheral board contains four separate functions:

Features:

- 1) two RS-232 serial ports: COM1 and COM2
- 2) a printer/parallel port
- 3) a game port adaptor
- 4) a real time clock

Without real-time clock \$159.00

1. SERIAL PORT

This board contains two RS232-C serial communications ports. Each is individually selectable or de-selectable by a set of jumpers, this allows the user to configure his machine without contention, in case he already has a serial port. The ports are located such that DOS recognizes them as COM1 and COM2: the primary and secondary serial ports respectively.

Each port is RS232 compatible with DTR, DSR, RTS, CTS, CD, and RI fully supported. In addition each port supports the IBM PC mA current loop. The controller is based on the 8250 chip and can support speeds up to 9600 baud.

2. PRINTER/PARALLEL PORT

This port allows any IBM compatible (parallel interface) printer to be connected to the system. The printer signals go through a DB25 connector and can be connected to many parallel printers. This card is not only for printers, but can be used where parallel data must be transmitted from the system. It has 12 TTL output lines which can be written and read under program control. Usually 8 are used for data and the others are used for handshaking with the external device. There is also an interrupt line which the external hardware can 'tickle' for prompt immediate service. (For such applications as real time data acquisition).

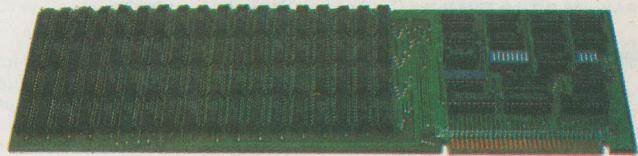
3. GAME PORT

The game port allows four paddles or two joysticks to be connected to the system. In fact any variable resistive element could be connected and the software would still give a value proportional to the resistance. This allows industrial applications to be realized easily with existing hardware.

4. REAL TIME CLOCK/CALENDAR

This option is based on the MM58274 chip. It is a CMOS chip, thus battery backup is easily implemented, and allows continuous time keeping even when the machine is powered down. Also included is the software drive and installation manual which incorporates the hardware into DOS.

BEST 512K RAM BOARD



The board provides the user with an impressive half megabyte expansion RAM to be used in conjunction with the RAM already on his main system board. The board has 8 banks of nine 64K RAM chips, 8 bits of data, 1 bit for parity. Each bank is individually selected: this implies that the user need not have continuous memory space but can have a gap of at least 64K. This is important for RAM-DISK users who want to protect their RAM-DISK from reset RAM checks of the bios. In addition the RAMboard can start on the following boundaries: 64K, 128K, 192K, and 256K. Thus, if you own an older IBM system with only 64K onboard, you are not excluded from using this board. Also there is a hardware switch which can enable or disable the onboard parity checking generator.

OEM designers please note: the above boundary and bank selection is not fixed since the selection mechanism is in proprietary firmware, and can be easily modified to suit individual needs.

512 Memory Board with 64K of Ram	\$179.00
512 Memory with 256K	\$259.00
512 Loaded Memory with 512K	\$365.00

Printers

Dot Matrix Printers

Exceltronix is a an authorized Star Micronics dealer and repair centre.

Star Micronics

1 Year warranty

Gemini 10X • 120 c.p.s., • 816 characters print buffer, option 4K or 8K • standard parallel, optional RS232C • tractor & friction feed

\$349.00

BEST SELLER



New from Star Micronics SG-10 Printer

Ideal for Text & Graphics

(Similar appearance to Gemini 10X/15X)

• Dual Mode - NLQ/draft standard (NLQ = near letter quality) • 120 CPS and 20% faster throughput • Bidirectional, logic-seeking • 2K buffer (expandable to 6K with optional buffer interface) • 100% IBM PC or Star standard control codes-switch selected • Friction and tractor standard • full 1 year warranty • 10" wide carriage • Standard parallel interface (serial optional)

\$399.00

SD-15 same as SD-10

Except with 15" carriage and standard 16K buffer

\$599.00

Radix

15" 200 cps, 100% duty cycle • 16k buffer • serial & parallel standard • proportional & downloadable characters • 240 x 144 Ultra High Res. • tractor & fiction...
Radix 15 PC (for IBM PC)

\$995.00

SR-15

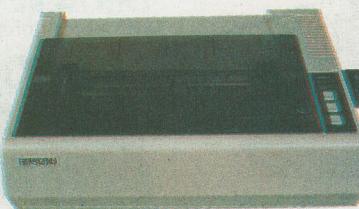
• 200 cps and 20% faster throughput • 100% IBM PC or Star standard control codes switch selected • Dual Mode - NLQ/draft standard • Friction/tractor and automatic single sheet feed - standard • 15" carriage • 16K buffer • Bidirectional, logic seeking • Price/performance leader • Parallel port standard, serial optional • Full 1 year warranty.

\$995.00

Star Printer Accessories

Printhead	\$80.00
Printwheel	\$18.00
Ribbons	\$4.50
Paper (500 sheets) (8½x11)	\$9.95
Paper (2,000 sheets) (8½x11)	\$32.00
Dust covers	\$8.50
Printer Stand (plastic) 10"	\$34.00
Printer Stand (plastic) 15"	\$38.00

Epson



1 year warranty,

RX80 • 100 c.p.s. • standard, Centronics-style 8 bit parallel optional IEEE 488, RS-232C, etc. • 10" tractor • RX80

\$495.00

RX80 F/T (all features as above + friction feed

\$615.00

FX80 • 160 c.p.s. • standard Centronics-style 8 bit parallel • 10" carriage, tractor and friction

\$749.00

FX100 • 160 c.p.s. • standard, Centronics-style 8 bit parallel • 15" carriage, tractor & friction

\$1,069.00

RX100 • 100 c.p.s. • standard Centronics-style 8 bit parallel • 15" carriage, tractor & friction

\$1,189.00

Epson

LQ1500 • 200 c.p.s. • NLQ (near letter quality) • optional: parallel, IEEE-488, RS-232C/current loop • 15", friction, optional tractor (\$79.00) •

\$1,895.00

Okidata

TOP VALUE

ML82A

• 120 cps bidirectional printing • 80 columns with standard characters • 132 columns with condensed characters • Friction and pin feed paper handling • Switch selectable serial and parallel interface

\$559.00

ML83A

• 120 cps bidirectional printing • 136 columns with standard characters • 224 columns with condensed characters • Friction and tractor feed paper handling

\$989.00

ML84

• 200 cps bidirectional printing • Word processing features, 50 cps correspondence quality printing, proportional character spacing • 231 columns with condensed characters • Tractor and friction feed paper handling • Parallel or optional serial interfaces • All Points Addressable graphics

\$1195.00

ML92

• 160 cps bidirectional printing • 40 cps correspondence quality printing • Proportional spacing • Six program-selectable character sizes • Friction and pin feed paper handling • Parallel interface standard • Serial RS232 optional

\$679.00

ML93

• 160 cps bidirectional printing • 40 cps correspondence quality printing • 233 columns with condensed characters • Tractor and friction feed paper handling • Parallel or optional serial interface • All Points Addressable graphics

\$1069.00

See page 22 for our Intelligent Printer Switch: essential aid in the classroom.

ML182 \$390.00

• 120 cps bidirectional printing • Friction and adjustable pin feed paper handling • Parallel interface (serial optional) • All Points Addressable graphics • 5 foreign language sets.

ML182S \$449.00

(with Serial option)

OKIMATE 20 \$389.00

• Color Screen Print Software Package • 80 cps unidirectional printing • 40 cps correspondence quality • 24 element, long-life printhead with snap-in "no tool" replacement • IBM character sets 1 & 2 plus • High resolution 144 x 144 DPI graphics • Plain, thermal or acetate paper • Friction and pin feed paper handling (roll paper stand optional) • Variable width tractor feed.

Qume

LP20 • 20 c.p.s. • 13" friction, opt. tractor • **\$1,080.00**

1140 • 40 c.p.s. • 15" friction, opt. tractor • **\$2,580.00**

1155 • 55 c.p.s. • friction, optional tractor • **\$2,880.00**

Smith Corona

(one year warranty)

L1000 • 12 cps • 10-12-15 c.p.i. • serial and parallel • friction feed, tractor optional • 13" paper width •	\$589.00
D-100	\$489.00
D-200	\$689.00
D-300	\$889.00
L-1000	\$589.00
Ultrasonic III Messenger	\$829.00

Star-Micronics — Power Type daisywheel printer

SUPER VALUE \$639.00



Features:

Printer: Static Font impact system

Print Wheel: 96 petal wheel

Print Speed: 18 c.p.s. bi-directional, logic seeking

Paper Slew Speed: 12 l.p.s. @ 1/6" spacing

Print Buffer: One line

Print Size: 10,12, 15 c.p.i and proportional spacing

Number of Columns: 110,132, 165

Character Sets: over 100 Type fonts available.

Special Features: proportional spacing; dual interface; standard printer mode and word processing mode; 32 easy access format switches reverse paper feed; short form tear-off; cassette ribbon; tractor optional; skip over perforation; 7 or 8 bit selectable interface; self-test

Line Spacing: 3,4,6,8 lines/inch; switch and software selectable

Paper Handling: single sheet: 5.5" to 8.5" wide; sprocket 4" to 13" wide; copies 3 carbonless sheets

Ribbon standard cassette

Interface standard parallel (Centronics compatible) and serial RS232C-20mA current loop

Dimensions 19.6" w x 14.3" d x 5.5" h

Weight 22 pounds

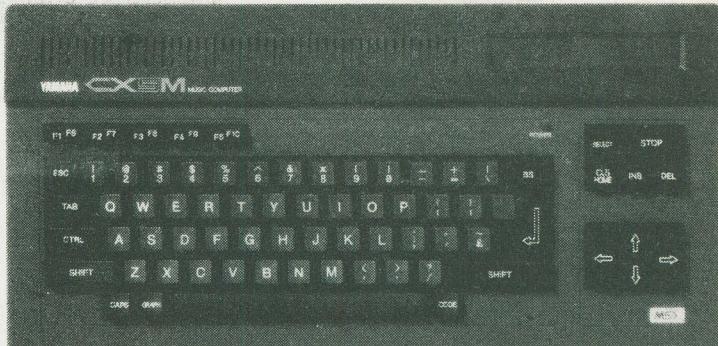
Product specifications and prices subject to change without notice.

INTRODUCING...

CANADA'S MIDI SPECIALISTS

XL electronix COMPUTER MUSIC CENTRE

 YAMAHA
CX5M System



CX5M SYSTEM

The CX5M is a computer designed specifically to be used by composers, and arrangers, both amateur and professional. With a digital FM voice generator built in — the same type as in the DX synthesizers — one can produce amazingly life-like sounds. Capabilities include an 8 track sequencer — the first where each track may be assigned a different voice — full rhythm accompaniment and a built-in MIDI interface to control compatible synthesizers, drum machines and other instruments. All this in a full-fledged Z-80A based microcomputer with Microsoft's MSX basic on board for only

\$695.00

THE MUSIC COMPOSER SYSTEM

The Music Composer System a sophisticated easy-to-use composition and arrangement aid. "Write" notes from the computer keyboard or the YK-10 music keyboard. Features on-screen music scoring, composing, editing and arranging of up to eight parts

\$59.95

THE FM VOICING PROGRAM SYSTEM

The FM Voicing Program System complete on-screen programming access to the built-in FM synthesizers. Edit existing voices or create your own

\$59.95

THE DX7 VOICING PROGRAM SYSTEM

Relief for the DX-7 owner! On screen graphic display of the DX-7's greatly simplifies programming and editing. A wealth of possibilities

\$59.95

RF-02 RF Modulator.....\$75.00 UDC-01 Data Memory Cartridge.....\$CALL CA-01 Single Cartridge Adaptor.....\$31.95

CX5M 3-1/2" Disk Drive.....\$CALL CX5M 5-1/4" Disk Drive.....\$CALL Disk Interface....\$CALL
CX5M Voice Library (700 sounds)....\$CALL Absolute Music Software....\$CALL
Unbeatable package prices available on request.

Excellent selection of musical keyboard at unbeatable prices

Roland DG

THE MPU-401 'INTELLIGENT' processor industry standard MIDI interface for your Apple/IBM

\$349.00

Interface...8 track recording software package price

\$549.00

Personal Composer Scoring Software . . Call

MIDI thru box Sync box MSQ 700. We carry the full line of Roland's ever expanding Computer Music Product.

THE FM MUSIC MACRO SYSTEM

The FM Music Macro System permits full control of built-in synthesizer from within BASIC programs. Create audio/visual programs and games incorporating top-quality FM voices

\$59.95

ACCESSORIES YK-01 AND YK-10 MUSIC KEYBOARDS

Accessories YK-01 and YK-10 Keyboards optional YK-01 (mini-keys) and YK10 (full size) input keyboards: allows real-time recording into the built-in sequencer as well as keyboard input when using the optional FM composer and FM voicing programs....YK-01 \$170.00
....YK-10 \$320.00

YAMAHA DX7/DX9 KEYBOARDS

TX816 FM modules, RX drum machines, QX-116 track MIDI recorder, DX PRO voicing software for DX7 (Apple), DX7 compatible RAM cartridges (half price!)

Passport Designs MIDI interface (Apple, C64), Polywriter Scoring Software, MIDI4 recording software

Music DATA voice cartridges (Yamaha, Roland), ADA sound sampling card (Apple), MIDI interface, and much, much more!

XLelectronix COMPUTER MUSIC CENTRE Inc.

music in reality....(416) 921-8941, 317 College St., Toronto, Ontario M5T 1S2
1-800-268-3798 — Order line only Mail Order phone (416) 252-5285



Exceltronix

Phone Orders: Local (416) 252-5285 Long Distance (orders only) 1-800-268-3798

Apple and Compatible Products

Exceltronix Super 6502 System: EXCEL2 . . . \$549.00



We strongly believe that our 6502 system will efficiently serve all of your needs; all of the options are on one board. Excel2 far surpasses many of the other 6502 systems.

Features:

- attractive case
- heavy duty power supply
- superior high quality professional keyboard with upper and lower case, and numeric key pad
- 80 x 24 video, with soft switch on board
- 64K of RAM on board
- 2 Drive Floppy controller on board
- Five additional expansion slots
- Fully assembled and tested, 90 day limited warranty
- (System comes with blank EPROMS on board; does not include any proprietary boot software or Basic)
- Systems are professionally assembled and tested (boards are wave/flow soldered and ultrasonically cleaned.).

Apple Products



**Apple
IIc**

Call for
best price

Apple IIc Disk Drive (60 day warranty) \$425.00

Multiflex Apple IIc compatible Drive
(one year warranty) \$229.00

Apple IIc Mouse & Software \$199.00

Apple Mini Monitor \$199.00

Apple IIe call for best price

Apple IIe Disk Drive (90 day warranty) \$420.00

Multiflex Apple IIe compatible Drive
(one year warranty) \$199.00

Apple Macintosh call for best . package deal price

For Mac Software and Accessories, see elsewhere
in this catalogue.

EXCEL 6 Package . . . \$689.00



Features include:

- our super 6502 system (same board, with same features, as used and described in the EXCEL2 package, BUT:
- comes with new attractive case (as seen in picture)
- IBM compatible extra high quality serial keyboard
- Multiflex serial to parallel programmable ASCII converter card
- Extra heavy duty power supply, with RFI filter and power light indicator built into the power switch.
- Special silent 3" Fan is built in, to keep your system cool.
- Room for 2 Apple compatible disk drives.
- Blank EPROMS included, but does not include any proprietary Boot software or Basic.
- Monitor not included in price.

EXCEL 6 Package

WITH ONE APPLE COMPATIBLE FLOPPY DISK DRIVE \$879.00

WITH TWO DRIVES \$1,069.00

**EXCEL 6 Ultra Loaded
Package \$1,665.00
DON'T MISS THIS OFFER!**

TOP VALUE

- EXCEL 6 system
- 2 built-in drives (Apple compatible)
- complete Z80 Card (CP/M software not included)
- Multiflex Parallel Printer Card and Cable
- Star Gemini 10X Printer
- Zenith or Amdek 12" green screen or amber monitor, with video cable

APPLE COMPATIBLE DISK DRIVES

Famous Multiflex

Drives One year warranty

\$219.00

**for Apple
II+ and IIe**

Now available

for Apple IIc \$229.00

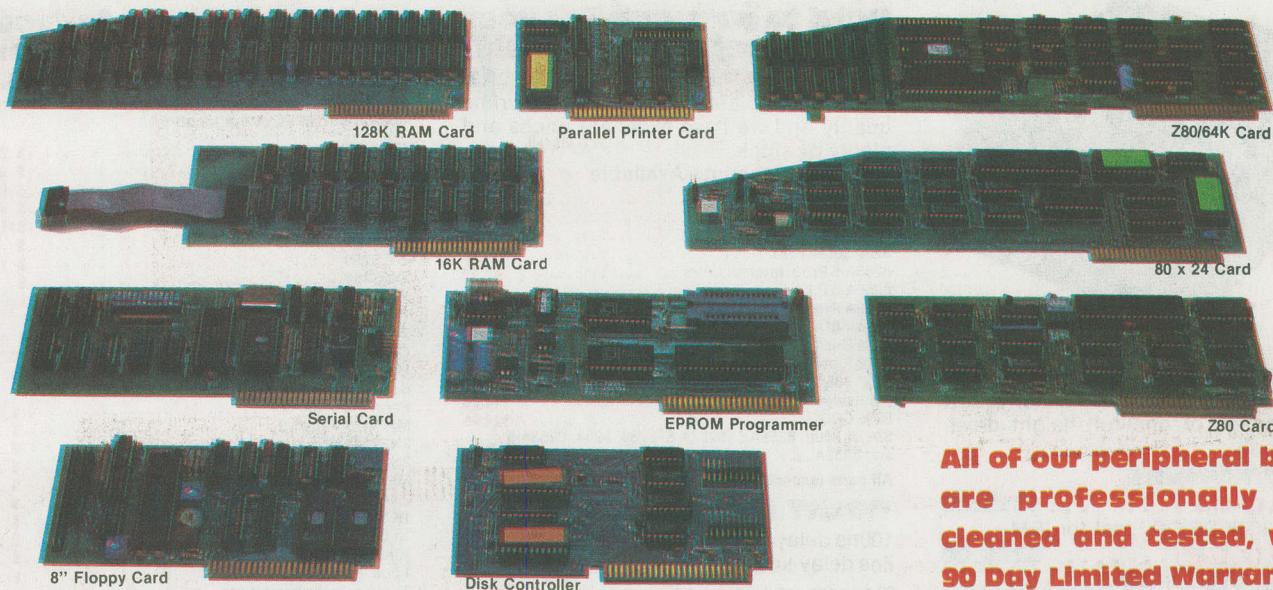
Features:

- Apple compatible • Attractively packaged • Professionally built and tested
- Canadian Made • 1 year warranty • We believe that Multiflex put out more drives in the last year than all other Canadian manufacturers combined.

SLIMLINE DISK DRIVE \$229.00

Attractively packaged, Apple compatible, ultra reliable (120 day warranty).

Apple Compatible Peripherals



All of our peripheral boards are professionally built, cleaned and tested, with a 90 Day Limited Warranty.

MULTIFLEX NEW SUPER 80 X 24 VIDEO CARD WITH SOFTSWITCH \$69.00

This new Multiflex card features: • superb 80 columns by 24 lines display, with upper and lower case, reverse video • includes built-in soft switch, allowing you to switch between the Apple's 40 column and the video cards 80 column from the keyboard. • superb compatibility.

MULTIFLEX 16K RAM CARD \$49.00

Expand your 48K Apple II+ to 64K. The Multiflex 16K Ram Card allows other languages to be loaded into your Apple from disk or tape.

WIZARD 16K RAM CARD \$99.00

Same functions as Multiflex 16K Ram Card

MULTIFLEX 128K MEMORY CARD . . . \$135.00

(with 128K of RAM on board)

With 64K of RAM on board \$99.00
(software not included)

128K Card can be used to function as RAM disk with your Apple.

MULTIFLEX UPGRADED Z80 CARD \$45.00

This card allows the user to run Z80/8080 programs on his Apple II+ or Ile computer. Specifically, it allows him to run the CP/M operating system with all its attendant software such as word processors, accounting packages, etc. (CP/M software not included).

MULTIFLEX Z80-64K CARD

This spectacular card provides you with the functions of a Z80 card along with giving you extra 64K of self contained memory, on top of the existing memory in your Apple computer. (Software not included)

\$149.00

MULTIFLEX PARALLEL PRINTER INTERFACE CARD WITH CABLE

This card plugs into any of the Apple II+, IIe, or work-alike computers, and provides the user with a parallel interface capable of handling graphics and characters. Ideal for use with the Star Gemini and Epson Printers.

BEST SELLER \$65.00

WIZARD IPI INTERFACE \$109.00

MICROTEK APPLE DUMPLING PARALLEL CARD \$135.00

Similar functions as Multiflex Parallel Printer Interface Card with Cable.

WIZARD BUFFERED PARALLEL INTERFACE CARD

BPO 16 \$229.00
BPO 32 \$279.00

MULTIFLEX SUPER SERIAL CARD \$69.00

This card allows you to: • select desired baud rate • connect to a serial RS-232 modem, terminal, or a serial printer port • for example, connect two Apple computers (using this card) to communicate with each other, through the RS-232 link over hundreds of feet.

APPLE COMPATIBLE ECONO-MODEM . . . \$79.00

- Direct Connect
- Plugs into your Apple or compatible computer
- Autoanswer, Autodial
- 110 or 300 Baud
- Comes with software and documentation.

SUPER SPECIAL MULTIFLEX FLOPPY CONTROLLER \$44.00

Features:

- plugs right into slot #6 in your Apple computer
- capable of handling up to two Apple compatible drives.

MICROTEK SERIAL CARD FOR THE APPLE . . \$139.00

Similar functions to MULTIFLEX super serial card.

MULTIFLEX EPROM PROGRAMMER \$69.00

Features:

- Eprom programmer for Apple computers • Programs 2716, 2732, 2732A, 2764 • ZIF socket for the EPROM
- Complete with software • Comes with a built-in programming voltage supply.

Included with the card is a disk full of software, which using menus allows the user to program or verify EPROMS, check if they are blank, set pointers anywhere in memory, and save or load memory ranges to/from the disk drive, making this unit a very versatile piece of hardware for the hardware developer or hobbyist.

MULTIFLEX APPLE COMPATIBLE MODEM SUPER SPECIAL

EXCELLENT HAYES MICROMODEM COMPATIBILITY



Plugs into your Apple or compatible computer. Direct connect, 300 Baud, Autodial, Autoanswer, Touch Tone/Pulse Dial, complete with documentation.

Hayes is a registered trade name. \$159.00



Exceltronix

Hobbyist Delights

DISK DRIVES **BEST SELLER**

**only \$189**

The real thing! SA455 Shugart 5-1/4" Slimline DS,DD, 360k, 40 tracks per side disk drive **IBM compatible**. Two drives fit into the space of one full height drive. With warranty.

Tandon Drives

TM65-2L (5-1/4") \$199.00

Slimline 360k DS,DD ideal for IBM

TM100-2 (5-1/4") \$299.00

Full height, ideal for IBM

Ideal for Apple Drives

SA390 Drive mechanism \$159.00

(All you need extra is analog board)

Hard Disk

10 MEG. slimline \$889.00

10 MEG. Seagate, slimline drive and hard disk controller. This controller can handle up to two 10 MEG hard drives

10 MEG Drive & Controller \$1099.00

Quantity Discounts Available

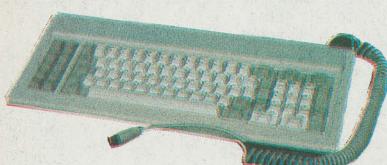
Seagate 20 MEG. slimline \$1099

Seagate 20 MEG. with controller \$1395.00

Controller alone (for 10 or 20 MEG.) \$349

Cables (for 10 or 20 MEG.) \$38.00

KEYBOARDS FOR YOUR IBM COMPATIBLE



Cherry \$129.00

Maxiswitch \$129.00

Keystronics 5151 Extended \$299.00

Keystronics Open Frame (no case)

Programmable (Serial Out) \$69.00

MULTIFLEX SERIAL KEYBOARD ENCODER

- change the serial code into parallel ASCII output with programmable characters.

- Ideal for your apple, or any 6502 system with ASCII input.

You will love it and to the best of our knowledge, only we carry such a deluxe feature board.

\$69.00

Handheld Numeric Keypad with decoder \$9.95

Instead of struggling and building your own elusively cheaper peripherals, buy our high quality guaranteed fully tested and professionally built flow-soldered and ultrasonically cleaned products at unbelievable prices.

Hard to get parts for your IBM compatible (8088) systems and peripherals

Please appreciate that our parts are prime quality and we have excellent prices and plenty of stock.

Quantity Discounts Available

8088 CPU	\$14.95
8087 Math Processor	\$219.00
8237A-5 Prog. DMA Cntrl.	\$14.95
8250 Serial Port	\$11.50
8253A-5 Prog. Interval timer	\$7.50
8255A-5 P.I.A.	\$6.95
8259A Prog. Interrupt Cntrl.	\$6.95
8284A ADC clock gen & driver	\$7.75
8288 Bus Controller	\$15.50
8272 Floppy Disk Controller	\$14.95
NEC 785 Floppy Disk Controller (equivalent to 8272)	\$14.95
8086 CPU	\$24.95
Set of 8088, 8255A-5, 8237A-5, 8288, 8284, 8253A-5 and 8259A	\$73.00

All parts (except NEC765) are prime parts made by Intel.

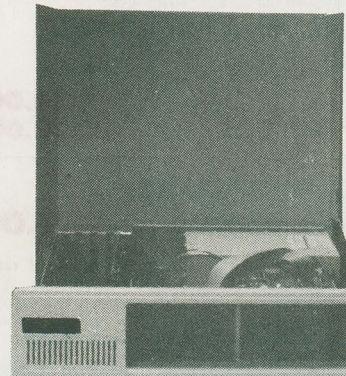
DELAY LINES

100ns delay line	\$6.95
7ns delay line	\$13.95

62 pin edge con (high quality)	\$2.40
5 pin Din conn	\$1.25
Power conn	\$1.25
Dip switch 8 pos	\$2.49
4.7k x 6 dip	\$.69
4.7k x 8 pin dip	\$.69
8.2k or 10k 16 pin Resistor or network	\$.99
33ohm x 8 network	\$1.10
Small speaker	\$1.99
.1uf 50V high quality bypass capacitors	\$.13
Trimcap	\$.99
34 pin card edge con. for your floppy controller	\$5.95
74LS322	\$6.95
74LS629	\$3.30
74LS670	\$1.75
74S280	\$3.65
74LS125	\$.60
74S157	\$1.75
74LS244	\$1.25
74LS245	\$1.25
74LS273	\$1.50
75477	\$1.45

Prices can change without notice. Check our ads monthly in ETI and CN! magazines for current prices.

Cases for your IBM and Compatible



- Hinged top cases allowing easy access by opening top half of the case. Can be supplied with plain back or for 5 or 8 slots. Please specify spacing and number of slots when ordering \$74.95

- Above case with power supply and fan
For Apple compatible 75 Watt \$169.00
For IBM compatible 150 Watt \$219.00

Hard to get parts for your 6502 Systems and Apple Compatible Peripherals.

Remember — prime quality, ultra good prices and super good stock at all of our locations!

6502 CPU	\$ 5.50
6845 CRT controller	\$ 9.50
68A45 CRT controller	\$ 9.95
Z80A CPU (4 MHz)	\$ 4.99
MC3242	\$11.95
74LS367	\$.82
74LS259	\$ 1.39
74LS161	\$.99
74S74	\$.82
74S174	\$ 1.70
74LS323	\$ 4.55
Card edge connector (50 pin)	\$2.49
RCA jack PC mount	\$.89
6 pin power square connector	\$.99
Phono jack (small)	\$.99
MPSA13 trans	\$.55
2N3904 trans	\$.19
2N3906 trans	\$.27
MPSU51 trans	\$.79
2N4258 transistor or equiv	\$.69
1K SIP 10 pin	\$.69
1K SIP 8 pin	\$.69
10K SIP 10 pin	\$.75
4 pos dip sw	\$.95
20 pin female header for disk drive	\$1.79
20 pin male	\$1.69
50 pf trim cap	\$.89
220 ohm trimpot	\$.69
20 conductor ribbon cable	\$.89/ft.

MEMORY Untouchable Prices! Guaranteed Prime Stock

Dynamic RAMs

4116 1x16k (150ns)	\$ 1.19
2118 1x16k (200ns) single + 5V supply	\$1.00
4164 1x64k (150ns)	\$ 3.49
4164's (150ns). Order 75 or more	\$2.99 ea.
41256 1x256k (150ns)	\$19.95

Special pricing for 50 or more

Static RAM

2114L 4x1k 200ns	\$ 2.25
6514 4x1k CMOS 450ns	\$ 4.99
6116 8x2k 150ns	\$ 8.99
(CMOS low power consumption)	
2018 8x2k 150ns	\$ 8.25
6164 8x8k 150ns	\$38.00

EPROMS

2716 450ns 8x2k	\$ 6.19
2716 300ns 8x2k	\$ 7.45
2732 450ns 8x4k	\$ 5.95
2732 250ns 8x4k	\$ 5.95
2764 300ns 8x8k	\$ 6.95
27128 350ns 8x16k	\$13.95

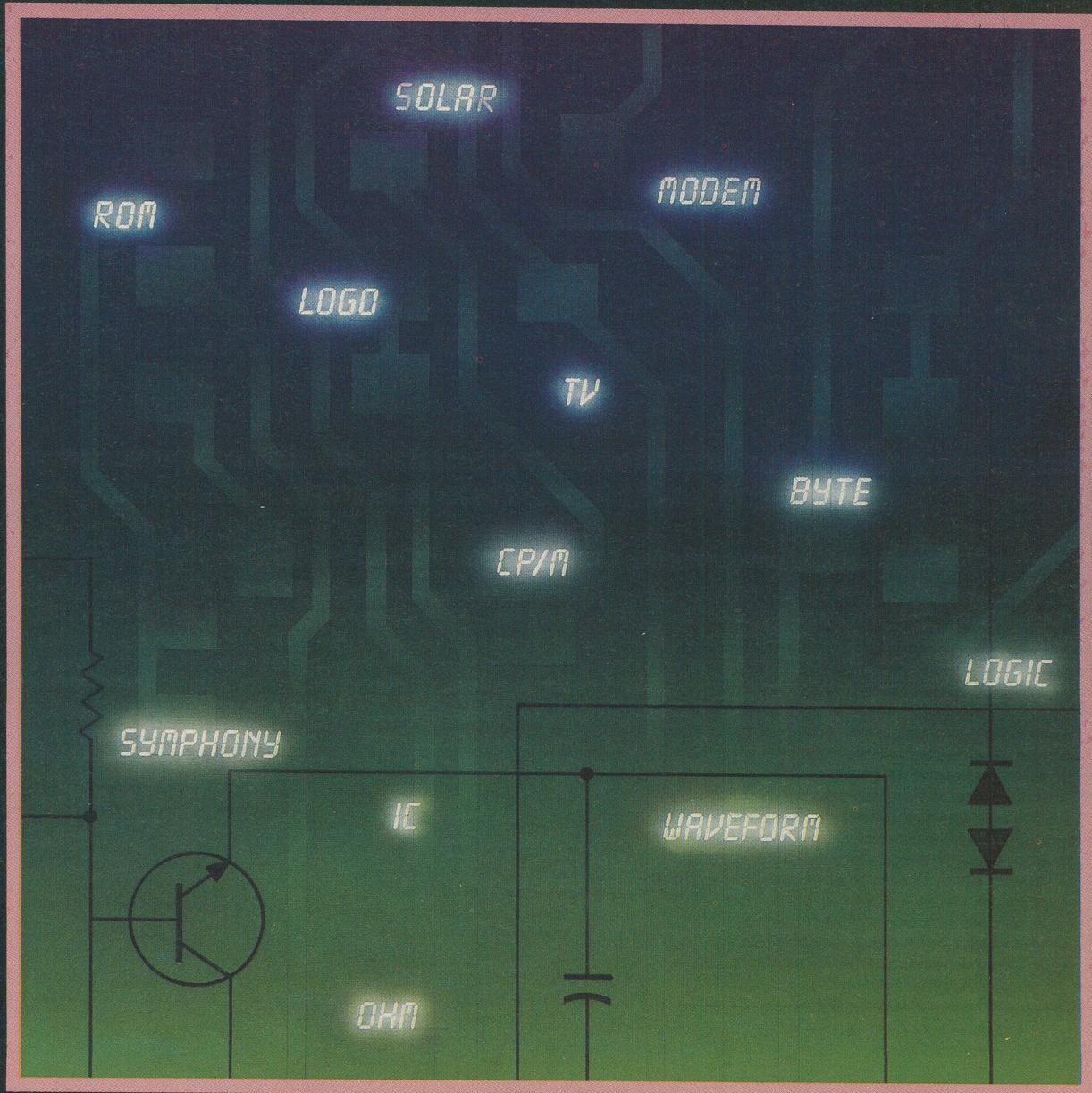
Electrohome NEW 5" green screen monitors \$59.00

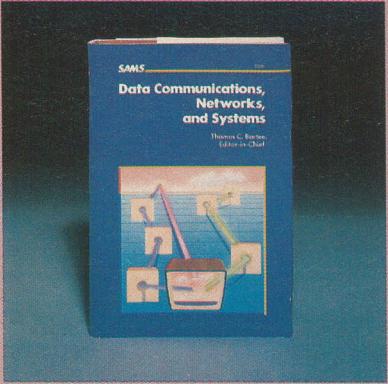


- brand new open frame monitor, requires 12V power supply. Sync Separator, if needed \$13.00

SAMS

Spring '85 Books and Software Catalog





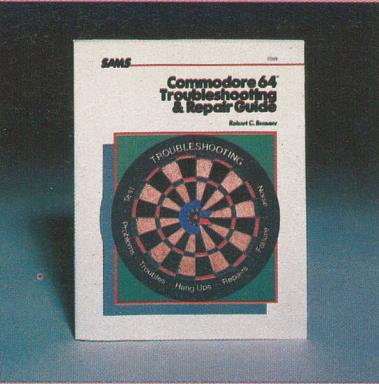
DATA COMMUNICATIONS, NETWORKS, AND SYSTEMS

Respected professionals in their respective areas of expertise combine to present a comprehensive view on the subject. All significant technologies in the data communication area are clearly presented in this valuable reference work.

Reference work.
Tom Bartee, Editor

Tom Barrie, Editor
416 pages, 6½x9½, hard-bound
ISBN 0-672-22235-3. © 1985

No.815605 \$55.95

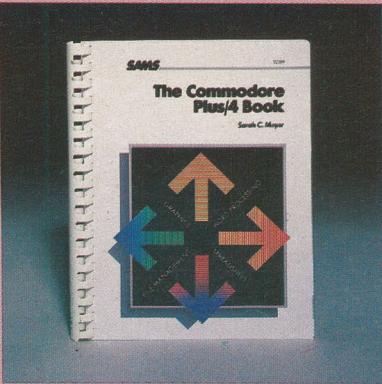


COMMODORE 64™ TROUBLESHOOTING AND REPAIR GUIDE

Is your Commodore 64 on the fritz? It may be something you can repair yourself simply and inexpensively. Troubleshooting flowcharts allow you to diagnose the probable cause of failure and remedy it. A final chapter on advanced troubleshooting shows the more adventuresome how to perform more complicated repairs. Some knowledge of electronics required.

Robert C. Brenner
256 pages, 8½x11, softbound
ISBN 0-672-22363-5, © 1985

No.815459 \$26.95



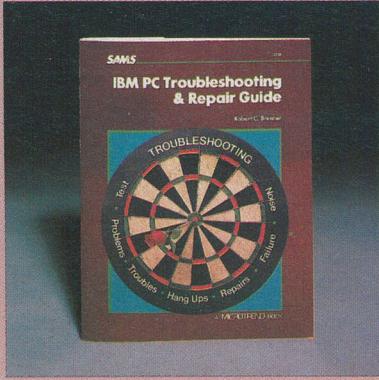
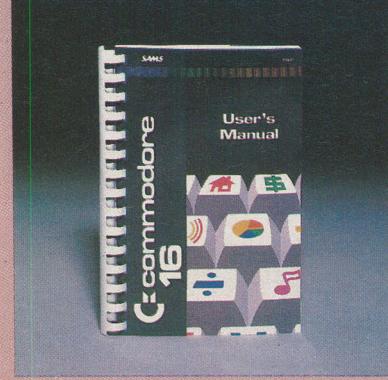
THE COMMODORE PLUS/4™ BOOK

Is the Commodore Plus/4 for you?
Learn about its capabilities, built-in
software, and expansion options.

Sarah C. Meyer

288 pages, 7½x10, comb-bound
ISBN 0-672-22389-9, © 1984

No. 815452 \$23.95



COMMODORE 16™ USER'S MANUAL

Take advantage of the capabilities of your new machine. Learn BASIC programming using graphics, color, sound and music. Get started immediately with the sample programs included. A complete encyclopedia of BASIC commands, statements, and functions provides an invaluable reference. This book is a must for every C-16 owner.

Commodore Computer
272 pages, 5½x8½, comb-bound
ISBN 0-672-22437-2, © 1984
No. 815451 \$18.95

NO. 815451 \$10.00

IBM PC TROUBLESHOOTING AND REPAIR GUIDE

Is your IBM PC on the fritz? It may be something which you can repair yourself simply and inexpensively. Troubleshooting flowcharts allow you to diagnose the probable cause of failure and remedy it. A final chapter on advanced troubleshooting shows the more adventuresome how to perform more complicated repairs. Some knowledge of electronics required.

Robert C. Brenner
192 pages, 8½x11, softbound
ISBN 0-672-22358-9, © 1985
No. 816017 \$26.95

WISCONSIN WISCONSIN WISCONSIN

TOOL KIT SERIES: COLECO® ADAM™ EDITION

Don't re-invent the wheel. This tool kit book provides you with a set of modular subroutines which can be incorporated into your BASIC programs. Seventy routines are included on color, sound, music, graphics, animation, and computational BASIC. Thirteen sample programs are included which show how to do this incorporation.

Buchholz and Dusthimer
208 pages, 8x9 1/4, softbound
ISBN 0-672-22312-0, © 1985

No.816838 \$13.95

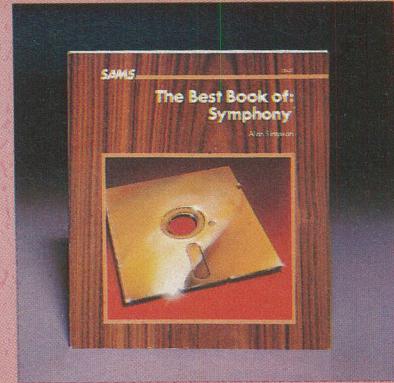
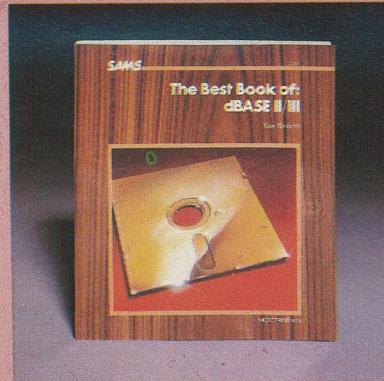
DISCOVERING MS-DOS™

The Microsoft generic version of DOS for the IBM PC is given the unique Waite touch. From complete description of the basic command set through analysis of architectural implications, you will gain a complete understanding of this operating environment.

Kate O'Day

240 pages, 7½x10, softbound
ISBN 0-672-22407-0, © 1985

No.815673 \$22.50



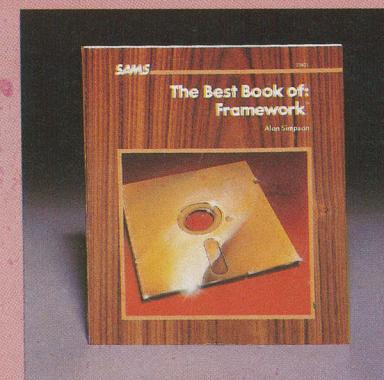
THE BEST BOOK OF: dBASE II/III

dBase II® and dBase III® have long been recognized as comprehensive data base management packages. But, they have also gained a reputation for being difficult to use. This book simplifies a very complicated product and allows you to get greater utility from this software.

**schwarc.
Ken Knecht**

256 pages, 7½x10, softbound
ISBN 0-672-22349-X, © 1985

No.815148 \$27.95



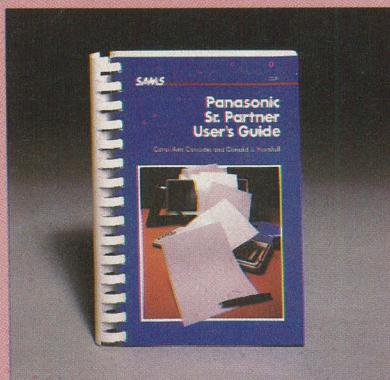
PANASONIC SR. PARTNER™ USER'S GUIDE

Uncover the full power of your totally integrated Sr. Partner. Sections include setting-up, applications software, internals, and appendices on software compatibility and MS-DOS. The essential Sr. Partner reference.

Casciato and Horsfall

360 pages, 5½x8½, comb-bound
ISBN 0-672-22381-3, © 1984

No.816439 \$26.95



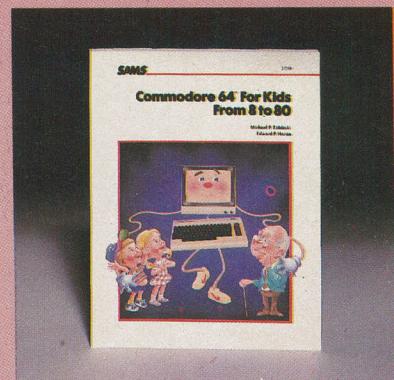
THE BEST BOOK OF: FRAMEWORK™

This introductory book shows you how to use Ashton-Tate's Framework software to its fullest potential. Covers word processing, spreadsheets, data base management, programming, and graphics. Advanced users can learn how to create automatic or custom operations that might otherwise require significant time at the keyboard. For anyone who writes, works with numbers, or needs rapid access to store information.

Allan Simpson

320 pages, 7x10, softbound
ISBN 0-672-22421-6, © 1985

No.815152 \$22.50



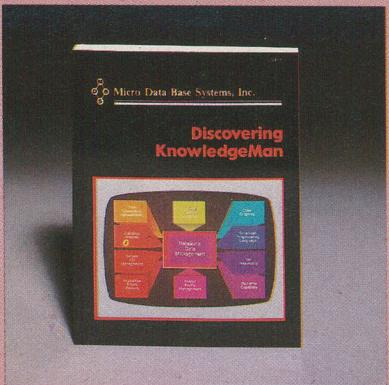
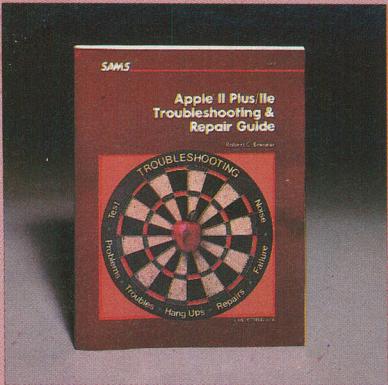
COMMODORE 64 FOR KIDS FROM 8 TO 80

Large format, varied activities, conversational approach, and extensive graphics all combine to create an excellent vehicle to introduce your children to microcomputers. Special computer camp principles help you learn fast. No background in microcomputers required.

Zabinski and Horan

128 pages, 8½x11, softbound
ISBN 0-672-22340-6. © 1984

No.815456 \$18.50



APPLE® II/IIe TROUBLESHOOTING AND REPAIR GUIDE

Is your Apple II or IIe on the fritz? It may be something you can repair yourself simply and inexpensively. Troubleshooting flowcharts allow you to diagnose the probable cause of failure and remedy it. A final chapter on advanced troubleshooting shows the more adventuresome how to perform more complicated repairs. Some knowledge of electronics required.

knowledge of electronics required.
Robert C. Brenner
256 pages, 8½x11, softbound
ISBN 0-672-22353-8, © 1984
No. 815062 \$27.95

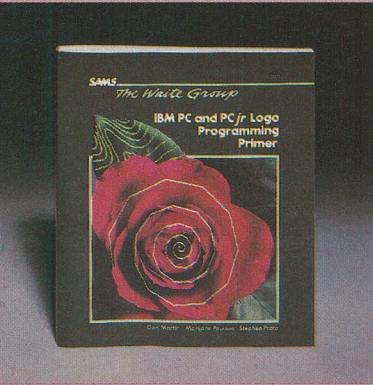
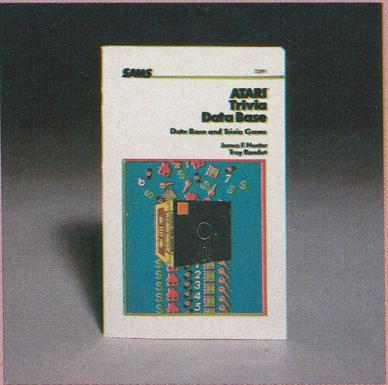
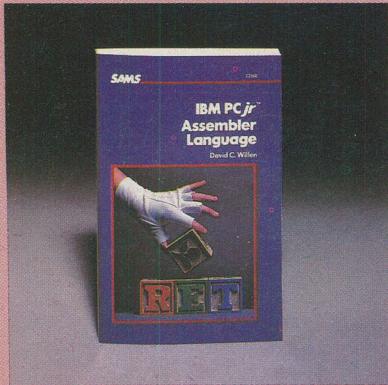
DISCOVERING KNOWLEDGEMAN™

Dynamic, powerful learning tool that quickly shows you how to use the KnowledgeMan information management system. Introduces KnowledgeMan's data management and spreadsheet capabilities, and goes on to teach you how to use each feature by actually working with the program in a step-by-step approach. Excellent tutorial.

Micro Data Base Systems, Inc.
384 pages, 7x9, softbound
ISBN 0-672-22415-1, © 1984
No.815672 \$27.95

IMAGINE THAT!

Create visually attractive graphics on your IBM PC the easy way. Anything you can imagine can be painted onto your PC screen. Requires IBM PC compatible system, 64K RAM, 1 double-sided disk drive, DOS 1.1 or 2.0, color monitor, and BASICA. IBM dot matrix printer with Graftrax optional. RGB color monitor recommended.



IBM PCjr® ASSEMBLER LANGUAGE

Incorporate the speed and power of assembler programming onto your IBM PCjr. Mnemonics and programming techniques are fully discussed. No need to let your fingers do the working . . . available in combo pack form with disk included.

David C. Willen
Book: 334 pages, 5½x8½,
softbound
ISBN 0-672-22360-0, © 1984
No. 815083 \$22.50
Combo Pack: ISBN 0-672-26221-5
No. 815084 \$34.95

ATARI® TRIVIA DATA BASE

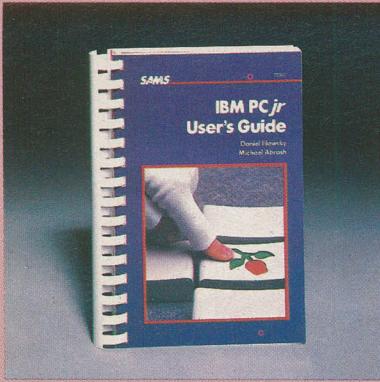
Learn the fundamentals of computer data base management. This book consists of two complete programs which are presented in module form. The first is a data base management system, and the second is a game for one to 4 players which accesses that data and scores points for prompt and correct responses. Do your own program loading or save time and effort with the pre-packaged combo pack.

Hunter and Rondot
Book: 108 pages, 5½ x 8½, softbound
ISBN 0-672-22397-X, © 1984
No. 815090 \$12.50
Combo Pack: ISBN 0-672-26229-0
No. 815091 \$27.95

IBM PC/PCjr LOGO PROGRAMMING PRIMER

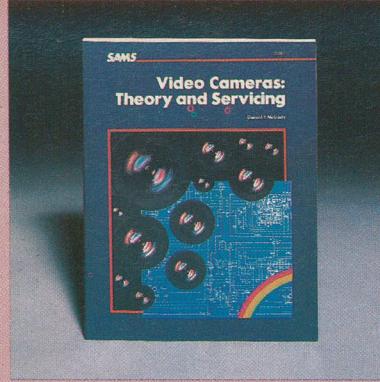
Quickly learn and use the complete Logo language to plan and write useful, fascinating programs that do exactly what you have in mind. Emphasizes structured, top-down programming techniques with box charts that help you discipline yourself for maximum effectiveness in planning, changing, and debugging Logo programs. Covers recursion, outputs, and utilities. Features include clear and concise diagrammatic explanations of Logo syntax.

Martin, Prata, and Paulsen
480 pages, 8x9½, softbound
ISBN 0-672-22379-1, © 1984
No. 816165 \$34.95



IBM PCjr USER'S GUIDE

Go beyond the explanations provided by the manufacturer's documentation for your IBM PCjr. Learn to fully utilize all of the features of this very powerful micro. Illowsky and Abrash 400 pages, 5½x8½, comb-bound ISBN 0-672-22302-3, © 1984 No. 816903 \$27.95



VIDEO CAMERAS: THEORY & SERVICING

You can't fix it unless you know how it works. This entry-level technical primer on video camera servicing provides practical theory in clear and well-illustrated sections. From the image tube through the electronics to final interface, all concepts are completely discussed. The final section on troubleshooting lets you put your new-found knowledge to work for profit.

Gerald P. McGinty
264 pages, 8½x11, softbound
ISBN 0-672-22382-1, © 1984

No. 816930 \$20.95

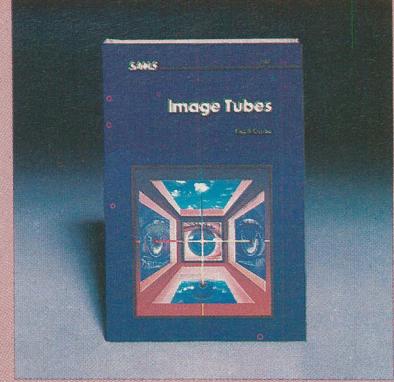


IMAGE TUBES

Learn the fundamental aspects of image-intensification camera tubes, light detection, electron optics, and imaging, as applied to image tubes, night vision, image intensifier systems, and the design and operation of image tube components. For those working or studying in these and allied fields of TV cameras, astronomy, medical research, electro-optical ranging, tracking, missile guidance, optical instrumentation, or electronic warfare, this is an excellent resource.

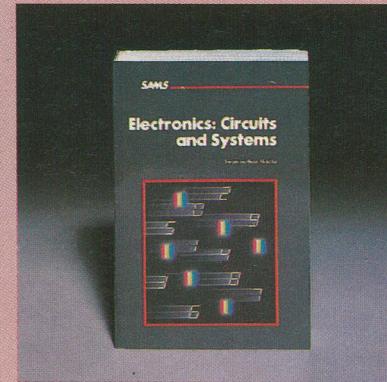


SEMICONDUCTOR GENERAL PURPOSE REPLACEMENTS

(5th Edition)

(CONT'D FROM P. 11) Nobody knows replacement parts and cross-referencing like Sams. Our years of experience developing Photofacts have provided us information which is shared here. Shows general-purpose replacements for almost 225,000 bipolar and field-effect transistors, diodes, rectifiers, ICs, and more, listed by US and foreign-type number, manufacturer's part number, or other ID. Easy to use and complete.

Howard W. Sams Engineering Staff
368 pages, 8½x11, softbound
ISBN 0-672-22418-6, © 1984
No. 816647 \$13.95



ELECTRONICS: CIRCUITS AND SYSTEMS

Provides non-electronic engineers, scientists, and middle managers with information on various aspects of today's electronic circuits and systems. Learn to intelligently communicate with electronic specialists and discuss electronics projects to make your own contributions in design and analysis. Emphasis is placed on understanding of physical concepts and applications of electronic technology rather than math techniques. Excellent for self-study and development.

Swaminathan Madhu
800 pages, 6x9, hard-bound
ISBN 0-672-21984-9, © 1985
No. 815780 \$55.95

BEST BOOK OF: MULTIPLEX



Multiplan was designed to be easy to use and it is, but taking full advantage of the hidden powers of the program takes more exploration. *Best Book of Multiplan* provides tips, tricks, and secrets which will enable you to design more efficient and useful models. Alan Simpson. 160 pages, 8x9 1/4 softbound, ISBN 0-672-22336-8, © 1984
No.815150 \$16.95

UNIX™ PRIMER PLUS



Another excellent Waite book. For those who want to learn about the amazing UNIX operating system, this primer presents UNIX in a clear, simple, and easy-to-understand style. This classic is fully illustrated and includes two handy removable summary cards to keep near your computer for fast reference. Waite, Martin, and Prata. 416 pages, 7 1/4 x 9 1/4, softbound ISBN 0-672-22028-8, © 1983
No.816897 \$27.95

KEYFAX FOR THE IBM PC

Put quick reference at your fingertips with Keyfax. This two-color rugged plastic template fits around your keyboard, and provides required keystroke information for applications software. Side 1 has the application keystrokes; flip it over, and Side 2 gives you the major commands for DOS on your machine.

Howard W. Sams & Co., Inc.
Lotus 1-2-3/DOS 1.1 & 2.0

No.819516 \$18.95

MultiMate™/DOS 1.1 & 2.0

No.819517 \$18.95

Multiplan/DOS 1.1 & 2.0

No.819518 \$18.95

SuperCalc/DOS 1.1 & 2.0

No.819519 \$18.95

VisiCalc/DOS 1.1 & 2.0

No.819520 \$18.95

WordStar® /DOS 1.1 & 2.0

No.819521 \$18.95

Word Vision™/DOS 1.1 & 2.0

No.819522 \$18.95

SOUND SYSTEM ENGINEERING



This reference guide was written for the professional audio engineer. Everything from audio systems and loudspeaker directivity to sample design applications and specifications are fully covered and explained. Davis and Davis. 296 pages 8 1/2 x 11, softbound ISBN 0-672-21156-4, © 1975
No.816740 \$30.95

APPLICATIONS
BUSINESS
APPLICATIONS
BUSINESS
APPLICATIONS
BUSINESS
APPLICATIONS
BUSINESS
APPLICATIONS
BUSINESS
APPLICATIONS
BUSINESS

BEST BOOK OF: LOTUS 1-2-3



Lotus 1-2-3 is a great and wondrous toolbox, waiting for you to open it up. Beginners crack the lid . . . but this book takes the lid off and teaches you to master all the powerful features available in the program. Alan Simpson. 272 pages 8x9 1/4 softbound ISBN 0-672-22307-4, © 1984
No.815149 \$18.50

UNIX SYSTEM V PRIMER



Waite at his best! This UNIX V Primer differs from most UNIX books in several ways. The entire powerful family of EX editors is included, of which V is a subset. Shell scripts and shell programming are covered in detail; and SED stream editor. Material on UNIX filters, text cut and paste, and the text formatting utilities of NROFF and TROFF are thoroughly explained. Complex forms of FIND and AWK are also covered.

Waite, Martin, and Prata. 432 pages, 8x9 1/4 softbound, ISBN 0-672-22404-6, © 1984
No.816898 \$27.95

HOW TO READ SCHEMATIC DIAGRAMS (3rd Edition)



A picture is worth a thousand words. A schematic speaks volumes, but only to those who know how to read it. This book teaches you to read these road maps of electronic circuitry, shows how contemporary components are combined to form circuits, and leads you step-by-step through a simple schematic. Tables include symbol definitions and logic symbols. Donald E. Herrington. 192 pages, 5 1/2 x 8 1/2, softbound ISBN 0-672-21127-0, © 1975
No.815991 \$12.50

ACTIVE FILTER COOKBOOK



Need an active filter, but don't want to take the time to design it? Don Lancaster presents a catalog of pre-designed filters which he encourages you to borrow and adapt to your needs. The book teaches you how to construct filters that include high-pass, low-pass, and band-pass having Bessel, Chebyshev, or Butterworth response. Can also be used as a reference book for analysis and synthesis techniques. Don Lancaster. 240 pages, 5 1/2 x 8 1/2, softbound ISBN 0-672-21168-8, © 1975
No.815030 \$20.95



**JOIN THE \$3 BILLION
COMPUTER MAINTENANCE BUSINESS**

If you can fix a television set, you can service a personal computer or peripheral with help from Sams COMPUTERFACTS™ repair data.

COMPUTERFACTS reveals the inner workings of major-brand micros, monitors, printers, and disk drives.

It includes schematic wiring diagrams, parts lists, disassembly instructions, troubleshooting techniques, and other repair data — all of it laboratory tested, and all of it usable by anyone with access to the tools and skills for fixing an ordinary TV set.

**COMPUTERFACTS
Covers All Major Brands**

Sams has COMPUTERFACTS for computers and peripheral equipment by

Amdek®,	NEC®,
Apple,	Osborne®,
ATARI,	Panasonic,
Commodore,	Radio Shack,
Epson®,	Rana,
Franklin,	Sanyo®,
Hitachi®,	Texas Instruments
IBM,	and Zenith®.

And more COMPUTERFACTS are coming out every month.

1985 COMPUTERFACTS™

Brand/Model Coverage	Month	Product Number	Price
Amdek® 300 Plus monitor	Jun	815560*	\$25.95
Amdek 500 monitor	Jun	815563*	\$25.95
Apple® II A2M0003 disk drive	Mar	815565	\$25.95
Apple II A3M0039 monitor	Mar	815566*	\$25.95
Apple II computer	Mar	815564	\$25.95
Apple Imagewriter printer	Apr	815567	\$25.95
ATARI® 800XL computer	Sep	815568	\$25.95
C.Itoh 8510 AP printer	Sep	815569	\$25.95
Coleco® ADAM™ computer	Dec	815570	\$49.95
Commodore 1701 monitor	Jan	815579*	\$25.95
Commodore 4023 printer	Sep	815571	\$25.95
Commodore Plus/ATM computer	Jan	815572	\$25.95
COMPACQ® 001 PC computer	Oct	815573	\$49.95
Epson FX-80 printer	Apr	815574	\$25.95
Epson FX-100 printer	Aug	815575	\$25.95
Epson QX-10 computer	Apr	815576	\$49.95
Epson RX-80 printer	Jun	815576	\$25.95
Gemini 10X printer	Oct	815577	\$25.95
Gemini 15X printer	Dec	815578	\$25.95
IBM® PCjr™ computer	Jun	815579	\$49.95
NEC® 3510 printer	Jul	815580	\$25.95
NEC 8023A printer	Jul	815581	\$25.95
Okidata 80 printer	Nov	815582	\$25.95
TRS-80® Model I (Level II) computer	Feb	815561	\$49.95
TRS-80 Model III computer	May	815583	\$49.95
TRS-80 Color Computer	Jul	815584	\$25.95
TRS-80 26-1164 disk drive	Feb	815585	\$25.95
TRS-80 26-1160, 61 disk drive	May	815586	\$25.95
TRS-80 DMP-120 printer	Feb	815562	\$25.95
Zenith® Z150 computer	Nov	815587	\$49.95
Zenith Z160 computer	Aug	815588	\$49.95
Zenith ZVM135 monitor	Jan	815589*	\$25.95
Zenith ZVM131 monitor	Mar	815590*	\$25.95

*Denotes COMPUTERFACTS set having coverage of more than one product.

**Denotes coverage of more than one product in same set of COMPUTERFACTS data.

COMPUTERFACTS NOW AVAILABLE

Brand/Model Coverage	Product Number	Price
Amdek Color 1 & Video 300 monitors	815543**	\$25.95
Apple II, II Plus computers	815531	\$25.95
ATARI 400TM computer	815542	\$25.95
ATARI 800TM computer	815551	\$25.95
Commodore 64TM computer	815537	\$25.95
Commodore 1541 & VIC 1541 disk drives	815552	\$25.95
Commodore 1525 printer	815550	\$25.95
Commodore 16TM computer	815554	\$25.95
Commodore VIC 20TM computer	815534	\$25.95
Epson MX-80 F/T printer	815535	\$25.95
Epson MX-100 printer	815539	\$25.95
Franklin Ace 1000TM computer	815548	\$25.95
Hitachi® CM1481 monitor	815537**	\$25.95
IBM 5151 & 5153 monitors	815547**	\$25.95
IBM 5152-002 printer	815554	\$25.95
IBM PC (5150) computer system	815545	\$49.95
NEC PC8025A printer	815556	\$25.95
Osborne® OCC1 & OCC1A computer systems	815540	\$49.95
Panasonic CT-1310M monitor	815536**	\$25.95
Panasonic CT-1320M monitor	815553**	\$25.95
Panasonic CT-1350MG monitor	815541**	\$25.95
Panasonic CT-1920M monitor	815557**	\$25.95
Rana Elite I disk drive	815549	\$25.95
Rana Elite II disk drive	815538	\$25.95
Rana Elite III disk drive	815533	\$25.95
Sanyo® AVM 196 monitor	815557**	\$25.95
Texas Instruments TI-99/4ATM computer	815532	\$25.95
Zenith ZVM-121 monitor	815541**	\$25.95
Zenith ZVM-122A/123A monitors	815553**	\$25.95

SAMS computer books and software are available at better book and computer retailers across Canada.

Available in stock or by special order from:

National Chainstores

Classic Bookshops
Coles, The Book People
W.H. Smith Bookstores
Compucentre Computer Stores

Regional Chainstores

London Drugs (BC)
Super Software (BC)
Scitron (ON)

Single Location Stores

Mall Book Bazaar (Vancouver, BC)
Mica Computer Books (Vancouver, BC)
Audrey's Bookstore (Edmonton, AB)
Kell-Max Computing (Medicine Hat, AB)
Keywords Bookstore (Calgary, AB)
Soft Option (Calgary, AB)
Futronics (Moose Jaw, SK)
Liberation Books (Winnipeg, MB)
Clore and Son (Hamilton, ON)
Computer Book & Supply (Toronto, ON)
Computer Circuit (London, ON)
Computer House Software (Waterloo, ON)
Desk Top Computers (Kitchener, ON)

Databay Ltd. (Thunder Bay, ON)

G. Weir Computers Ltd. (Islington, ON)

Harris Data Systems (Scarborough, ON)

Lichtmans (Toronto, ON)

Lyon's Logic (London, ON)

Prospero Books (Ottawa, ON)

Odyssey Books (Ottawa, ON)

World's Biggest Bookstore (Toronto, ON)

IPL Informatique (Montreal, PQ)

Le Camelot (Montreal, PQ)

Maison De L'Ordinateur (Montreal, PQ)

Micro Boutique (Montreal, PQ)

Dick's and Co. (St. John's, NF)

Micro-Tech (St. John's NF)

Computer World (Moncton, NB)

Softec (Fredericton, NB)

Westminster Books (Fredericton, NB)

Basic Computer Sales (Halifax, NS)

Book Room (Halifax, NS)

Minicomp (Halifax, Dartmouth, NS)

Book Mark (Charlottetown, Summerside, PEI)

Fort Smith (Fort Smith, NT)

Yellowknife (Yellowknife, NT)

Dealer Inquiries:

Gus Crees
Copp Clark Pitman Ltd.
495 Wellington Street West
Toronto, Ontario M5V 1E9
(416) 593-9911 Telex: 06-217849

Mail Orders:

Norland Communications
4269 Torino Crescent
Mississauga, Ontario M4W 3T4



Copp Clark Pitman

SPECTACULAR GANG EPROM PROGRAMMER AND EMULATOR

Totally self-contained (has its own display, entry keypad and power supply).

Based on the Z-8 microprocessor.

Can program up to 8 EPROMs simultaneously (anywhere from one to 8 EPROMs at the same time with the information in its own memory or master EPROM).

Each of the 8 EPROM programming sockets is individually buffered and isolated from one another providing protection in situations when there is a bad EPROM among the eight being programmed. Clearly indicates and singles out any defective or marginal EPROMs prior to or after programming.

After programming the unit does a full VERIFY routine of the EPROM (at a Max Vcc of 5.4V and a Min Vcc of 4.5V) to ensure high reliability of your EPROMs. Very simple to use.

A standard unit contains 8x16K of on-board memory which is sufficient in most cases, but can easily optionally be upgraded to 8x64K of on-board memory.

The Gang Programmer can handle a wide selection of EPROMs: 2716, 2732, 2732A, P2732A, 2532, 2564, 2764, 27128, 27128A and optionally upgradeable to handle 27256, 27512, 2758 and 2724.

Gives you option of entering the data which you want to be programmed on the EPROM through a built-in keypad and display into the EPROM programmer's built-in RAM or by downloading the data to be programmed by

RS232 interface (110 to 9600 Baud). The RS232 is standard — not optional!

Data can be checked or modified, since you can examine any memory location of the programmers built-in RAM, this holds true even after you have down-loaded through the RS232 from your computer; you can check or modify the memory before finally programming it on your EPROMs.

Read Master EPROMs; you can plug in a programmed EPROM, dump it into the programmers RAM, check the contents on display by stepping through the memory and, if you wish, you can alter any location before copying to other EPROMs.

EPROM Programmer can also be (optionally) used as an EPROM emulator, saving hours of frustration, reprogramming and waiting.

Using the Emulator option, you can enter via the keyboard or down-load through the RS232 from your computer or development system, the information which you think is right for whatever project you are building. This is the same information which you would normally burn into an EPROM, plug into your new un-debugged processor and moments later you realise that you forgot to enter a code or that you must add or delete some codes. This normally would mean waiting 20 minutes for erasing of the EPROM and reprogramming and wasting time.

Using the Emulator option, you simply plug in a 24 or 28 Pin buffered pod into the socket on your board where you would normally fit the

EPROM, the difference being now that you can have all the information in the programmers RAM, connected to the pod by a ribbon cable and you can start your testing. If you wish to change, add, delete any codes, you can modify the contents of the programmers RAM using the keypad and display and continue testing moments later. Keep in mind that the RAM is protected from being accidentally altered.

Complete package with EPROM Emulator, 8 ZIF sockets, Gang Programmer with 16Kx8 of RAM and RS232 \$695.00

Gang EPROM Programmer with 8 ZIF sockets, 16Kx8 RAM and RS232, without Emulator \$499.00

Gang EPROM Programmer with 4 ZIF sockets, 16Kx8 RAM and RS232, without Emulator \$449.00

EPROM Programmer with only one ZIF socket, 16Kx8 RAM and RS232, without Emulator. Able to do all the functions describe but can handle only one EPROM at a time \$399.00

UV EPROM Erasers

Industrial quality EPROM erasers.

Erase time about 15-20 minutes

Starting at \$129.00

Multiflex Low-Cost Logic State Analyzer

You've just completed a microprocessor system, and it doesn't work. What next? You can use an oscilloscope to check for clock signals and the like, but if everything appears to be in order you can't go much further without sophisticated equipment. In these situations, professionals turn to their logic state analyzers, each of which cost thousands of dollars. MULTIFLEX has the answer for all those people who don't want to take a mortgage on their house just to get a computer working. The MULTIFLEX Logic State Analyzer has all the essential features of those more expensive units at a fraction of the cost. This is a high-quality piece of test equipment, suitable for industrial or scientific use, but its price is well within the price range of a hobbyist.

Easy to understand and operate, the Logic State Analyzer allows you to monitor 16 points in a digital system (ie. data and/or address bus, or control lines) which carry continually changing signals. You can select a bit pattern you expect will appear at these points. Once the pattern appears the Analyzer will trigger and record ("freeze") the next 1023 bit patterns so that they can be examined step by step even though data is no longer available in the unit being examined. For software development the Analyzer is in-

valuable, especially in dedicated systems. If you design a microprocessor system for a specific function, and you have no monitor, assembler or other such software, the best and often only way to debug the system is to use a logic analyzer. It will let you look closely at the data flow as a program is executing, or monitor the address lines to make sure that the instructions are being executed in the proper sequence. The various control lines such as memory read and write, DMA, interrupts, or enable and disable signals can also be examined. You can, of course, monitor any combination of these signals, such as the data bus and half of the address bus, or half of each plus 4 control lines. The combinations are endless.

A special feature of the MULTIFLEX Logic State Analyzer is that any number of units can be interconnected for dealing with larger input words. With two Analyzers, you can monitor the address and data bus of an 8-bit processor at the same time and have 8 spare signals to monitor the control lines, I/O signals or signals from external devices. Anyone who will be doing any systems debugging should take a close look at this unit, since its features and low price tag make it an asset.

EPROM Emulator

If you are a computer designer who values your time, you can't afford to be without this!

Did you ever write a piece of code, burn it into an EPROM, plugged it in and it didn't work?

Did you then go through the code (using an analyzer or your brain power) and then discover you left out some crucial byte which caused the processor go the point of no return?

If the above holds true, how many EPROMs have you reprogrammed, erased and damaged? More important how many hours have you wasted?

Put an end to all the above problems and save time, money and frustration: Buy an EPROM Emulator.

It allows you to download over RS232 (at 300 to 9600 Baud) a program from your computer into the Emulator's memory (16Kx8) and then simply plug a 24 or 28 Pin header connected via ribbon cable to the Emulator in place of your EPROM and you have successfully emulated an EPROM.

If you need to change your code, simply change it on your computer, download to the Emulator's memory and you are back in business in seconds.

This stand-alone product emulates the following EPROMs: 2716, 2732, 2764 and 27128. Can be used with any computer with an RS232 interface.

This product is a must for any hardware development since it allows the user to test and modify EPROM data roughly 20 times faster than conventional methods.

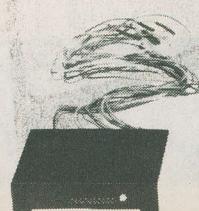
The Emulator normally comes attractively packaged and contains its own power supply. However, to make it more affordable for beginners, we have separated the price into several categories:

1. Complete Emulator with 16Kx8 memory, attractively packaged with power supply. Fully assembled and tested with warranty \$189.00

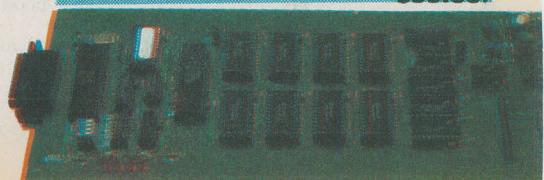
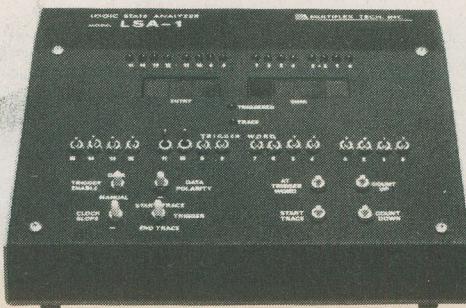
2. As above but with 8Kx8 of memory \$159.00

3. Emulator with 4K RAM, no housing or power supply (requires +5V at 1.5A Max, +/- 12V at 0.03A). Fully assembled and tested \$99.00

Ideal Educational Tool and a
MUST for the Hobbyist.



**A&T
\$295**





Excelonix

Mail Orders: 319 College Street, Toronto, Ontario, M5T 1S2

IBM and Apple Accessories

IBM Accessories (For PC & XT)

AST Research
Six Pak plus 64K, upgradeable to 384K, with clock calendar, serial and parallel ports \$499.00

Mega Plus II 64K, upgradeable to 256K (or more with MegaPak) with clock calendar and serial port.....\$499.00

Combo plus (64K), upgradeable to 256K, serial and parallel ports & clock calendar.....\$499.00

Orchid Technology
Blossom w/64K to 384K.....\$549.
PC Net Blossom 64K.....\$1165.

Other local area networks available from 3 Com

Titan Multi-Function Board for PC
2 serial ports, parallel port, hard disk interface, clock, memory 64K to 576K bytes w/software.....\$899.

Apstek
Handi I Plus - Multifunction Board
parallel & serial ports, 384K, clock/calendar w. software.....\$369.00

Attachmate
3270 coaxial interface.....\$2595.00

Conway
Corn Graphics.....\$529.00

Hercules
Monochrome card.....\$650.00
Colour card.....\$365.00
Graphics card w. par. port.....\$589.00

Tecmar
Graphics Master.....\$819.00

Roland
DXY 4-Pen Plotter.....\$1119.00

Quadram
Quadcolour I.....\$339.00
Quadcolour II.....\$689.00

IBM
IBM Colour card.....\$359.00
IBM mono card.....\$389.00

64K Memory Upgrade kits.....\$29.50

Mouse Systems
Mouse w/pop-up menus (requires RS-232).....\$299.00

BEST MODEM

The BEST modem is a smart 1200/300 direct connect modem. It can either be a stand-alone unit in which case it requires a small wall adaptor, or it plugs in one of the IBM slots. When used as a stand-alone unit, the modem looks like a Hayes 1200 Smart Modem, that is, it emulates the same instruction set. When it is used in the IBM, it looks like an intelligent serial communications port which also supports a super-set of the Hayes instruction set.

The modem supports auto-dial, auto-answer, and auto-speed select directly from software control. The modem also has a speaker so that aural monitoring of the call is possible. There are also LED monitors so that the state of the modem can always be known. These LEDs are: Modem Ready, Auto-Answer enabled, Carrier Detected, Transmitting,

Keyboards compatible — IBM

Cherry \$129.00
Maxiswitch \$129.00



Keytronics
5150 (sim. to IBM style kybd) \$285.00
5151 extended keyboard/ horizontally placed function keys/ separate cursor pad/ separate number pad \$299.00

Auto Pilot complete voice interface system for use with the IBM PC & XT and compatibles. Your IBM can respond to voice commands and works with Lotus 1-2-3, VisiCalc, Multiplan, Multimate \$759.00

IBMTM is a registered trademark of IBM. Prices subject to change.

Modems and Communication Products

Hayes
Smartmodem 300 \$356.00
Smartmodem 1200 \$799.00
Smartmodem 1200B w/Smartcom II \$695.00
Micromodem IIe \$399.00

Anchor
Mark VII (AA/AD) \$189.00
Mark XII (1200 Bd) \$469.00

Networker
300 baud, direct connect, manual w. software \$199.00

EMP
MM101 \$79.00
300 bd. direct connect.

Apple Accessories

Titan
"Accelerator" for Apple \$795.00
6502, makes your Apple run 3½ times faster. 64K

Spectronics
EPROM erasers avail. from \$129.00

For cables and cable assemblies see page 21.

Printer Interfaces for Apple, Commodore, TRS-80 and Atari Star Micronics

INTERFACE	APPLICATION	APPLICABLE PRINTERS	PRICE
Grafstar II	Apple II, II+ IIe and Apple compatible computers	Star Standard Printers*	\$126.00
IEEE488X	Commodore CBM computers, Hewlett Packard	Gemini-10X/15X	\$130.00
Gemini-10X/15X Serial	Serial Output Device	Gemini-10X/15X	\$ 90.00
4010X 4K Serial	Serial Output Device (Usable with Modem)	Gemini-10X/15X	\$190.00
Universal/Atari Parallel	Atari 400, 800 and XL Series	All Star Printers	\$135.00
Universal/Commodore Parallel	Commodore 64 Series and VIC-20	All Star Printers and VIC-20	\$ 90.00
BUFFERS			
Gemini-10X/15X 4K Buffer	Increases internal buffer to 4K	Gemini-10X/15X	\$167.00
Gemini-10X/15X 4K Buffer Upgrade	Increases 4K buffer	Gemini-10X/15X	\$Call

Wizard

Intelligent printer int; optional buffer.

IPI	.....	\$99.00
BP016K	.....	\$229.00
BP032K	.....	\$279.00

Microtek	Apple Dumpling	.....	\$135.00
	Commodore	.....	\$135.00

Orange Micro	Grappler + printer interface	.....	\$199.00
	RTC PLINK (for C 64)	.....	\$99.00

Botek	for TRS-80	.....	\$85.00
	for Apple IIc	.....	\$159.00

APPLE COMPATIBLE ECONO-MODEM . \$79.00

- Direct Connect
- Plugs into your Apple or compatible computer
- Autoanswer, Autodial
- 110 or 300 Baud
- Comes with software and documentation.

MULTIFLEX APPLE COMPATIBLE MODEM SUPER SPECIAL EXCELLENT HAYES MICROMODEM COMPATIBILITY



Plugs into your Apple or compatible computer, Direct connect, 300 Baud, Autodial, Autoanswer, Touch Tone/Pulse Dial, complete with documentation.

Hayes is a registered trade name. \$159.00

Receiving, Data Set ready.

Software packages such as Crosstalk, PC-talk, and Hayes' Smartcom II also will run with this modem.

A version with 300 Baud only is available.



300 Baud \$179.00 300/1200 Baud \$379.00

Monitors and Disk Drives

Monitors

**Zenith
Data
Systems**



BEST SELLER ZVM 122A • 12" diagonal screen • non-glare amber display • composite input • 25 lines x 40/80 characters
\$135.00

BEST SELLER ZVM 123A • 12" diagonal screen • non-glare green display • composite input • 25 lines x 40/80 characters
\$129.00

CV-2560 • 25" diagonal screen • RGB/composite input • 25 lines x 80 characters • sound capability • green screen only switch • video "loop thru" feature
\$1,049.00

ZVM 124 • 12" diagonal screen • non-glare amber display • PC monochrome input (TTL) • 25 lines x 80 characters • 720 x 350 pixels • IBM PC & compatibles
\$229.00

ZVM 131 • 13" diagonal screen • RGB/composite inputs • 25 lines x 40 characters • 320 x 240 pixels • sound capability • green screen only switch • video "loop thru" feature
\$479.00

ZVM 133 • 13" diagonal screen • RGB input • 25 lines x 80 characters • 640 x 240 pixels • green screen only switch • 16 colours including PC brown
\$759.00

ZVM 135 • 13" diagonal screen • RGB/composite inputs • 25 lines x 80 characters • 640 x 240 pixels • sound capability • green screen only switch • video "loop thru" feature
\$799.00

ZVM 136 • 13" diagonal screen • RGB input • 25 lines x 80 characters • 640 x 480 pixels • long persistence phosphors for interlaced applications •
FOR BEST PRICE **\$1195.00**

IBM

IBM Monochrome Monitor **\$429.00**

Amdek

300A Amber **\$249.00**
310A — Amber, 18 MHz **\$289.00**
Amdek 600 RGB **\$899.00**
Amdek 700 Ultra high res **CALL**
Optional tilt swivel for above available.

Roland (14")

CC141 (RGB) **\$879.00** CB141

Princeton Graphics

HX-12 RGB hi res. colour **\$749.00**
Max-12 IBM monochrome in amber **\$359.00**
SR-12 hi res. colour **\$1,285.00**
(needs Scan Doubler) **\$369.00**

Disk Drives

Sysgen

II-10 **\$4,500.00**
II-20 **\$5,600.00**
10 & 20 MByte hard disk with cassette backup.

Tallgrass (call for best pricing)

TG-3012 12 MB disk tape **\$4395.00**
TG-3020 20 MB disk tape **\$4595.00**
TG-3/35 35 MB disk tape **\$7495.00**
TG-3170 70 MB disk tape **\$9985.00**
TG-09 IBM hardfile int. **\$189.00**
TG-300 DC-300 XL cartridge tape **\$53.00**

Add a 10 or 20 Meg Hard Drive and tape drive to your IBM PC.

Using the BEST Expansion System allows you to add hard drives, tape drives plus 8 more expansion slots to your existing IBM PC. Self contained unit in an IBM style case with its own 150W power supply. Simple connection through a spare slot in your IBM PC. System has plenty of spare power for extra cards and up to two hard drives.
With 10 Meg Drive and 8 slots **\$1595.00**
With 10 Meg, 8 slots and Tape Drive **\$2995.00**
With 20 Meg Drive and 8 slots **\$1895.00**
With 20 Meg, 8 slots and Tape Drive **\$3395.00**

Tandon

TM65-2L (5 1/4") **\$199.00**
Slimline 360K, DS, DD. Ideal for IBM
TM100-2 (5 1/4") **\$299.00**
Full weight, Ideal for IBM

Disk Drives: **BEST SELLER** **SA455** **\$189.00**

• Shugart 5 1/4" slimline double sided double density disk drive 360K storage capacity. IDEAL FOR IBM COMPUTERS.



SA390

\$159.00

• disk drive mechanism (does not include analog board) • 5 1/4" single sided disk drive • ideal for use with the APPLE if you make your own analog board.

Hard Disk Drives

Seagate (industry favoured)
10 MEG. slimline **\$889.00**

10 MEG Seagate, slimline drive and hard disk controller. This controller can handle up to two 10 MEG hard drives.

LOWEST PRICE OF \$1099.00

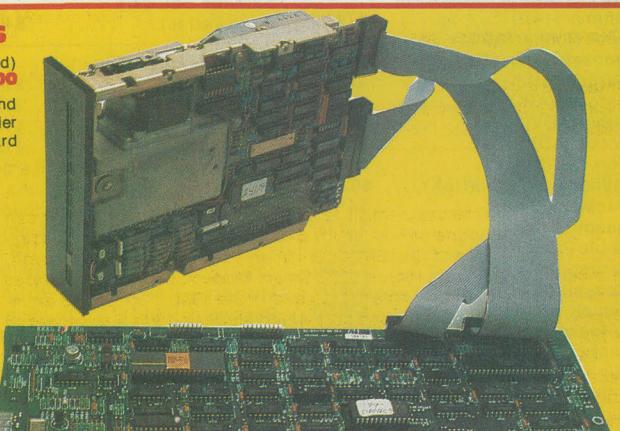
Quantity Discounts Available

Seagate 20 MEG. slimline **\$1099**

Seagate 20 MEG. with controller **\$1395.00**

Controller alone (for 10 or 20 MEG) **\$349.00**

Cables (for 10 or 20 MEG) **\$38.00**



Diskettes, Joysticks and other supplies

Maxell

MD1	\$29.00	FD1	\$59.00
MD2	\$39.00	FD2	\$69.00

Verbatim

VE1 SS/DD	\$28.00	8" SS/DD	\$55.00
VE2 DS/DD	\$38.00	8" SS/DD	\$65.00

BASF

BA1 SS/DD	\$26.00
BA2 DS/DD	\$36.00
MAC Disks	\$60.00

CDC

CDC-1 SS/DD	\$19.95
-------------	----------------

Accutrak

AC-1 SS/DD W/plastic case	\$26.00
---------------------------	----------------

Sentinel

Multicolour (1 colour 1 Box)

SS/DD **\$34.00**

DS/DD	\$48.00
-------	----------------

Opus

10 Disk + Disk Bank	\$28.00
---------------------	----------------

Printer Ribbons

Gemini	\$4.50
--------	---------------

Panasonic	\$11.95
-----------	----------------

Epson FX 80	\$11.95
-------------	----------------

Epson FX 100	\$18.95
--------------	----------------

Qume	\$10.95
------	----------------

Accessories

Anti Glare Screen	\$29.95
-------------------	----------------

3M Anti Glare Screen	\$45.00
----------------------	----------------

Disk Drive Cleaner	\$19.95
--------------------	----------------

Printwheels from	\$18.00
------------------	----------------

Joysticks

Econo	\$19.95
-------	----------------

Hayes — available for II+, III, IBM	\$52.95
-------------------------------------	----------------

Mach II	\$62.95
---------	----------------

Mach III	\$61.95
----------	----------------

Kraft	— available for Apple, IBM Deluxe	\$61.95
-------	-----------------------------------	----------------

TG

Deluxe	\$64.95
--------	----------------

CH Products

Mach II	\$52.95
---------	----------------

Mach III	\$62.95
----------	----------------

Paddles

Kraft	\$58.00	TG	\$49.00
-------	----------------	----	----------------

Paper

500 sheets (8 1/2 x 11")	\$9.95
--------------------------	---------------

2000 sheets (8 1/2 x 11")	\$32.00
---------------------------	----------------

2500 sheets (8 1/2 x 11")	\$39.95
---------------------------	----------------

Disk Banks

50	\$24.95
----	----------------



Exceltronix

Mail Orders: 319 College Street, Toronto, Ontario, M5T 1S2

Software and Books

IBM Software

We believe we have the best prices, check our monthly ads for super specials!

Features

Lotus 1-2-3 \$429.00

WordStar

Professional \$539.00

dBase III \$645.00

MultiMate \$449.00

Symphony \$650.00

Framework \$645.00

Accounting

BPI Accounting \$CALL

Electric Desk \$459.00

Data Base Systems

dBase III \$645.00

InfoStar Plus \$480.00

PFS File/PFS report \$129. ea.

dBase II to dB III upgrade \$209.00

Home / Personal Finance

Home Accountant Plus \$149.00

Utilities

Copy II PC \$47.00

Sidekick \$59.00

Turbo Pascal \$59.95

Smartkey II \$81.95

Sidekick \$62.95

Graphics

BPS business graphics \$269.00

dGraph \$269.00

PFS Graph \$129.00

Visicorp Vision (requires XT with 512K):

Visigraph \$329.00

VisiWord \$409.00

VisiCalc \$279.00

Visitrend/plot \$339.00

Visischedule \$339.00

Sorcim

Supercalc 3 \$379.00

Entertainment

Adventure/Arcade/Skill

Ultima II (AD) \$74.00

Lode Runner (ARC) \$36.00

Donkey Kong (ARC) \$36.00

Sargon III (SK) \$52.00

Frogger (ARC) \$39.00

Zork I (ADV) \$43.00

Zork II (ADV) \$43.00

Zork III (ADV) \$43.00

Millionaire/Tycoon (SK) \$CALL

PacMan (ARC) \$41.00

Deadline (ADV) \$51.00

Apple Panic (ARC) \$36.00

Serpentine (ARC) \$39.00

Genesis (SK) \$36.00

Temple of Apshai (ADV) \$39.00

Witness \$51.00

Suspended \$51.00

Flight Simulator \$59.00

Ultima II \$62.00

Education

Koala Touch Tablet \$172.00
Mastertype \$59.00
Game Show \$44.00
Wizard of Words \$44.00
Face Maker \$40.00

Training

ATI

How to use Lotus 1-2-3 (volume 1 & 2) \$78.00

How to use Wordstar (volume 1 & 2) \$78.00

How to use MultiMate (volume 1 & 2) \$78.00

How to use Microsoft Word \$78.00

Digital Research

CP/M-86 \$69.00
PL/1-86 \$759.00
PC DOS \$89.00

Lifetree

Volkeswriter \$189.00
Volkeswriter de Luxe \$229.00

Lotus Development

Lotus 1-2-3 (Version 1A) \$429.00
Symphony \$650.00
Symphony Upgrade \$345.00

Micropro

Wordstar w/tutorial on disk (version 3.3) \$419.00

Wordstar/MailMerge/CorrectStar/Starindex (ProPack) \$549.00

InfoStar Plus (version 1.6) \$480.00

Bank St. Writer \$80.00

Microsoft

C-Compiler \$520.00

Flight Simulator \$59.00

Multiplan (new version) \$199.00

Microsoft Word (ver. 1.1) \$389.00

Microsoft Word w/mouse (ver.1.1) \$495.00

Macro Assembler \$179.00

PC Mouse w/Paint \$289.00

Basic Interpreter \$355.00

Microstuf

Crosstalk XVI (for Hayes Smart-modem) \$186.00

Multimate International

Multimate w/80K word speller — An advanced word processor with all the features of a dedicated stand-alone system. Softword Systems MultiMate (ver. 3.22 w/spell checker & tutorial) \$449.00

Satellite Software

Word Perfect \$409.00

Software Publishing

PFS/File \$129.00

PFS/Graph \$129.00

PFS/Write \$129.00

PFS/Report \$129.00

PFS/Access — The first of a series of PFS telecommunications products. Works with the following modems: Hayes Smartmodem 300, 1200, 1200B; Novation 103 and 103/212 Smart-Cat; Transcend PC Modem Card; US Robotics Password; Ven-Tel PC MOdem Plus & others. \$115.00

SSI

Word Perfect \$409.00

Apple Software

Word Processing

Bank Street Writer \$68.00
Magic Window II \$149.00
Wordstar w/free CP/M card \$425.00
Screenwriter 11 \$99.00
Applewriter II/e \$217.00
Magicalc \$149.00
Appleworks \$299.00

Spreadsheet

Multiplan \$199.00
Supercalc III \$379.00
Visicalc \$229.00

Database

PFS file/report/graph \$128.00
dBase II \$459.00
dB Master \$279.00

Utility/Business

Locksmith 5.0 \$117.00
Quick code \$289.00
Sensible Speller \$125.00
Home Accountant \$79.00
Bag of Tricks \$46.00
Apple Mechanic \$32.00
Copy II Plus Utility \$48.95
Microsoft Applesoft compiler \$199.00

Beagle Bros.

DOS Boss \$32.00
Alpha Plot \$45.00
Frame Up \$35.00
Disk Quick \$33.00
Type Faces \$23.00
Beneath Apple DOS \$25.00

Games

Choplifter \$34.00
Temple of Apshai \$34.00
Sargon III \$48.00
Zork I, II, III \$34.00
Ultima II, III \$54.00
Flight Simulator II \$49.00
Chess — Odesta \$86.00
Koala Pad \$129.00
Wizardry III \$59.00
Wizardry I \$52.00
Wizardry II \$38.00
Lode Runner \$40.00
Zaxxon \$45.00
Music Construction Set \$48.00
Pinball Construction Set \$48.00
BC Quest For Tires \$48.00
Castle Wolfenstein \$32.95
Beyond Castle Wolfenstein \$36.95
Suspended \$52.00

Educational

Gertrude's Secrets \$43.00
Terrapin Logo \$129.00
Master Type \$34.00
Spellicopter \$48.95
Creature Creator \$48.95
Rocky's Boots \$52.00
Mockingboard & speech chip \$310.00
Mockingboard only \$165.00
Speech chip only \$165.00
Typing Tutor II \$26.95
Fortran 80 compiler \$199.00
Visiterm \$109.00
ASCII Express \$197.00

Books

Top Apple Books

Apple II User's Guide \$24.95
Apple II Circuit Description \$31.50
Creative Apple \$19.95
Basic Apple BASIC \$17.95
Apple Almanac \$23.95
Using 6502 Assembly Language \$23.95
Apple Logo \$22.95
DOS Manuals \$24.00
Apple Software '85 \$23.95
Blue Book \$29.00
Beneath Apple DOS \$27.95
Apple II Programmers Handbook \$22.95
Visicalc Book — Apple ed. \$18.95
Apple Fortran \$28.00
6502 Assembly Language Programming \$24.95
What's Where In the Apple \$32.95
Apple Connection \$18.95
Kid's and the Apple \$26.00
P. Source \$32.50
Nibble Express III \$23.95
Games Apple's Play \$19.95
Elementary Apple \$19.95
Apple IIe Programmers Reference Guide \$27.95
Introducing the Apple IIc \$24.95
Microsoft Word Made easy — Mac ed. \$21.95
6502 Programming \$19.95
Advanced 6502 Programming \$19.95
6502 Applications \$19.95
Apple Logo \$24.95
Discovering Apple Logo \$20.95

Top IBM Books

The IBM PC-DOS Handbook \$23.95
Your IBM Personal Computer \$24.50
IBM PC & XT Owner's Manual \$19.95
Learning IBM BASIC \$22.95
IBM Programs for Business \$26.95
Assembler for the IBM & XT \$23.95
PC DOS User's Manual \$18.95
IBM BASIC \$22.95
IBM PC Assembly Language \$26.00
Visicalc Book — IBM ed. \$22.95
1.2.3. Go \$19.95
Using 1.2.3 \$22.95
All About 1.2.3 \$13.95
Accounts Basic Programs for the IBM PC \$19.95
Interfacing to the IBM \$22.95
8087 — Applications & Programming for the IBM \$26.00
Assembly Language Programming \$CALL
Best Book of Lotus 1-2-3 \$19.95
IBM (CP/M-86 Users Guide) \$29.95
Essential PC-DOS \$CALL
Complete Guide to Multimate \$CALL
Mastering Applesworks \$CALL
Introduction to InfoStar \$CALL
MS DOS Users Guide \$21.95
PC DOS Users Guide \$23.95
1-2-3 For Business \$22.95
IBM Software 1984 \$26.95

Large stock of books and software at best prices

Software prices are changing rapidly at time of going to press. Call for best prices.

Multiflex Products

Multiflex Economy Video Display Terminal

Now available from MULTIFLEX is an economy video display terminal. Originally designed as a low cost access unit for our mail-ordering and bulletin board system, this terminal is a semi-intelligent system which is controlled by a Z80A microprocessor and a 6845 CRT controller chip. The keyboard is fully ASCII encoded and the character generator contains the full 128-character set as well as a 128-character alternate set both of which are in the 5x7 dot matrix format. The screen display is 80 characters by 24 lines if the unit is hooked to an external monitor. (Monitor not included). There are 3 software selectable attributes (dim, reverse video, and alternate character set) which can be chosen one at a time for the whole screen. The attribute can then be switched on and off for each individual character. A 2K buffer is provided for normal operation. However when the optional 6K memory upgrade is purchased, 4 screen pages can be loaded from the host machine, edited, locally, and then downloaded back to the host again saving on connect time and phone line bills. Also included are 2 RS232 ports: one for a modem and one so that a printer can be attached to the terminal. The baud rates on these ports are software programmable and can range from 110 to 9600 baud. With all these features, you would expect to pay a lot for this system, but all this is available to you, complete with an attractive case, for an extremely low price.

A&T board with keyboard (as picture top right) with one RS232 and 2K buffer
\$169.00



Terminal Complete: Tested and 90 days warranty with 2 RS232 ports, 2K buffer case and power supply (Hydro approved)

\$299.00

Special Pricing is available when both items on this page are purchased together



6809 Board

Multiflex Terminal

U of T 6809 Single Board Computer

The 6809 Single Board Computer, designed at the University of Toronto and distributed exclusively by EXCELTRONIX, is a compact hardware unit which was designed originally as a lab board for teaching students about microprocessor systems. Its many features, however, make it an ideal unit for stand-alone control applications or software development systems as well.

The system is designed around the Motorola MC6809 microprocessor. This is an 8-bit processor with full 16-bit internal architecture, 2 index registers, 2 stack pointers, 2 8-bit or 1 16-bit accumulators, a direct page register and a wide range of addressing modes, including a program-counter-relative mode. This mode allows the user to write completely position independent software, important in systems software development.

There is provision for up to 48K bytes of dynamic RAM on-board. The refreshing of this RAM is controlled by an 8202 Dynamic RAM Controller. This chip allows for completely transparent refreshing of the RAM (i.e. no wait states to slow the system down). There is also provision for up to 12K of EPROM using 2532 chips.

There are 4 complete I/O circuits built onto the board. 2 of them are serial (RS232); one is used for a terminal (which is required for use of the board with the supplied monitor software), and the other one is user definable, but it is set up to

communicate with either a modem or a printer. Also on-board are 2 6522 VIA chips. These provide 2 parallel ports per chip along with 2 16-bit timer/counters. One of the parallel ports and one of the timers are used by the monitor software to provide a cassette interface (which operates at 300 baud). The second parallel port on that chip is wired into a connector which is ideal for interfacing a parallel printer or keyboard. The 2nd VIA is not used at all and is completely free for the user. For further expansion of the system, a fully buffered version of the CPU signals (data, address, control lines and a signal indicating whether or not the current address is located on the board) is available at a cable connector.

The software provided with the system is in a 2532 EPROM and allows the user to: test the memory; dump blocks of memory; examine and modify single memory locations; read or write from the cassette port; set and examine breakpoints; single step and/or execute machine language programs and set and examine the processor registers. All this is accomplished through a 9600-baud terminal interface (one of the serial ports). Included is a full screen editor/assembler which allows the user to work in 6809 assembly language rather than machine language. All this makes this board an ideal trainer, control unit or software development unit for just about anyone.

Includes U of T course documentation

A&T with 48K
\$369



Exceltronix

Microprocessor Chips

6500 Series

6502	8-bit CPU (1 MHz)	5.50
6502A	8-bit CPU (2 MHz)	8.50
6522	VIA Versatile Interface Adaptor	7.50
6522A		8.95
6532	RIOT (128x8 RAM, I/O, Timer)	7.50
6545	CRT Controller	12.95
6551	ACIA Async. Comm. Interface Adaptor	11.00

6800 Series

6800	8-bit CPU (1 MHz)	4.30
6802	On Chip 128x8 1MHz CPU	7.60
68800	8-bit CPU (2 MHz)	7.39
6809	8/16-bit CPU (1 MHz)	10.50
68B09	8/16-bit CPU (2 MHz)	25.00
6810	128x8 static RAM	3.70
6821	PIA Peripheral Interface Adaptor	3.59
6840	Programable Timer	8.10
6844	DMA Controller	14.00
6845	CRT controller	9.50
68A45	CRT controller	9.95
6847	Video Display Generator	12.50
6850	ACIA	3.50
6852	Synchronous Serial Data Adapter	5.80
6860	0-600 Baud Modem	11.95

68000 Series

68000L8	16-bit CPU (8 MHz)	50.00
68000L10	16-bit CPU (10 MHz)	59.00
68008	16-bit CPU (8 bit data path)	52.00
68230	Parallel Interface Adapter	21.95
68450	6MHz 16-bit DMA Controller	250.00
68451	Memory Management Controller	189.00
68561	MPCC (68000 Compatible)	96.00

8080 Series

8080	8-bit CPU	9.80
8085	8-bit CPU	7.95
8088	16-bit CPU c/w 8-bit data bus	14.95
8087	Math Processor	219.00
8212	8-bit I/O Port	3.35
8214	Priority Interrupt Controller	4.99
8216	4-bit Bidirectional Bus Driver	2.65
8224	Clock generator for 8080/8085	9.50
8226	Inverting Bus Driver	9.00
8228	System controller for 8080/8085	9.55
8237A5		14.95
8251A	Programmable Communications Interface	8.50
8253A-5	Programmable Internal Timer	8.95
8253	Programmable Interval Timer	7.95
8255	Programmable Interface Adapter	8.25
8255A-5	Programmable Interface Adaptor	6.99
8257-5	Programmable DMA Controller	9.95
8259A	Programmable Interrupt Controller	6.95
8275	Programmable CRT Controller	24.00
8279-5PC	Programmable Keyboard Display Interface	7.90
8282PC	Octal latch, non inverting	8.55
8283PC	Octal latch, inverting	12.00
8284	Clock gen and driver	7.75
8286	8-Bit Bus trans. Non-Inverting	8.50
8287PC	8-Bit Bus trans. Inverting	8.69
8741ADC	Univ. Programmable Interface	34.95
8748DC	CPU, 4K EPROM, I/O	35.95
8749DC	CPU, EPROM, RAM, I/O	39.95
8755ADC	2048 x 8 EPROM, I/O	37.95

8086 Series

8086	16-bit CPU	25.00
8282	Octal Latch	8.75
8283	Inverting Octal Latch	6.69
8284	Clock Generator for 8086/8088	7.75
8288	Bus Controller	14.95
8289	Bus Arbiter	40.95
8272	Floppy Disk Controller (Equiv. to NEC 7E5)	14.50

Z80 Series

Z80A-CPU	8-bit CPU (4 MHz)	5.50
Z80B-CPU	8-bit CPU (6 MHz)	10.00
Z80A-PIO	Parallel I/O	5.95
Z80A-CTC	Counter Timer	5.95
Z80A-DART	Dual Asynchronous Receiver Transmitter	12.95
Z80A-DMA	Direct Memory Access	18.95
Z80A-SIO-0	Serial I/O ver. 0	18.95

Misc. Microprocessors and Peripherial Chips

AY3-1015	UART	(Single 5V Supply)	4.50
AY5-1013	UART		5.60
S1602	UART		4.75
TMS9918	Sprite Graphics Generator		18.95
TMS99532	FSK Modem		19.95
COM5016	Dual Baud Rate Generator		18.10

Integrated Circuits

COM8116	Dual Baud Rate Generator (5V supply only)	16.75
KR3600	Keyboard Encoder	16.50
MSM5832	Real-time Clock	18.10
MSM58321	Real-time Clock	
SND5037	CRT Video Timer Controller	32.25
WD2143	4-phase Clock Generator for Floppy Disks	
FDC1771	Single Density Disk Controller	19.00
FDC1793	Double Density Disk Controller	47.00
FDC1795	Double Density/Sided Disk Controller	69.00
FDC2793	Dbl. Density Disk Controller c/w precomp.	55.00
FDC2795	DDDS Disk Controller c/w precomp.	59.95
FDC9216	Floppy Disk Data Separator	15.95
NEC765(8272)	Floppy Disk cont.	14.50

CMOS

4000	Dual 3 input NOR gate	36
4001	Dual 2 input NOR gate	36
4002	Dual 4 input NOR gate	36
4006	18 static shift register	82
4007	Dual complementary pairs/Inverters	35
4008	4 bit full adders	1.25
4009	Hex buffer/converter (inverting)	82
4010	Hex buffer/converter	82
4011	Quad 2 input NAND gate	36
4012	Quad 4 input NAND gate	36
4013	Dual D Edge triggered flip flop	47
4014	8 bit static shift register	1.00
4015	Dual 4 bit static shift register	82
4016	Quad bilateral switch	46
4017	Decade counter/divider	90
4018	Presettable divide by N counter	90
4019	Quad and/or select gate	55
4020	14 stage binary/ripple counter	95
4021	8 bit static shift register	95
4022	Divide by 8 counter/divider	95
4023	Triple 3 input NAND gate	36
4024	7 stage binary counter	80
4025	Triple 3 input NOR gate	36
4026	Decade counter/divider	1.30
4027	Dual JK flip flop	50
4028	BCD to decimal decoder	85
4029	Presettable up/down binary/decade counter	90
4030	Quad XOR gate	42
4033	7 segment decoded counter	1.00
4034	8 stage universal bus register	1.95
4035	4 stage PISO shift register	97
4038	Triple serial register	2.00
4040	12 stage binary/ripple counter	89
4041	Quad true complement buffer	79
4042	Quad clock D latch	75
4043	Quad tri state NOR/S latch	75
4044	Quad tri state NAND/R/A latch	80
4046	Micropower phase locked loop	95
4047	Low power monostable/astable multivibrator	84
4049	Inverting hex buffer	45
4050	Hex buffer	45
4051	Single 8 channel multiplexer/demultiplexer	80
4052	Dual 4 channel multiplexer	90
4053	Triple 2 channel multiplexer/demultiplexer	90
4054	4 segment display driver	99
4055	BCD to 7 segment recorder/LCD driver	1.75
4056	BCD to 7 segment recorder/LCD driver	1.75
4060	14 stage binary counter/oscillator	95
4066	Quad bilateral switch	45
4068	8 input NAND gate	35
4069	Hex inverter	35
4070	Quad 2 input XOR gate	36
4071	Quad 2 input OR gate	36
4072	Dual 4 input OR gate	36
4073	Triple 3 input gate	36
4075	Triple 3 input OR gate	36
4076	4 bit D register	90
4078	8 input NOR gate	36
4081	Quad 2 input AND gate	36
4082	Dual 4 input AND gate	32
4086	Expandable 4 by 2 AND/OR invert gate	52
4093	Quad 2 input NAND Schmitt trigger	65
4094	8 stage shift/store register	99
4097	Diff 8 channel analog mux/demux	1.90
4099	8 bit addressable latch	99
4501	Industrial control unit	4.80
4502	Strobex Hex inverter/buffer	1.25
4503	Hex tri state buffer	99
4504	Hex level shifter	2.00
4506	Dual Expandable A/OI gate	2.50
4508	Dual 4 bit latch tri-state	1.75
4510	BCD up/down counter	95
4511	BCD to 7 segment latch/decoder/drive	95
4512	8 channel data separator	89
4514	1 of 16 decoder/demultiplexer	1.85
4515	1 of 16 decoder/demultiplexer	1.85
4516	Binary up/down counter	95
4518	Dual BCD up counter	95
4519	4 bit AND/OR select gate	80
4520	Dual binary up counter	95

4521	24 state frequency divider	2.75
4522	BCD divide by N counter	1.60
4526	4 bit binary divide by N counter	1.10
4527	BCD rate multiplier	1.10
4528	Dual retriggerable/resettable monostable	1.10
4529	Dual 4 channel mux	1.30
4530	Dual 5 input majority logic gate	1.65
4531	12 bit parity generator/checker	1.50
4532	8 bit priority encoder	1.10
4534	Real time 5 decade counter	7.99
4536	Programmable timer	2.75
4538	Dual precision monostable multivibrator	1.30
4539	Dual 4 channel digital multiplexer	1.25
4541	Quad 2 input analog mux	1.25
4543	BCD to 7 segment latch/decoder/drive	1.05
4553	3 digit BCD counter	3.50
4555	Dual binary 1 of 4 decoder	99
4556	Dual binary 1 of 4 decoder	99
4557	1-6 bit shift register	4.87
4558	BCD to 7 segment decoder	3.55
4560	NBCD adder	5.69
4561	9's complimentor	2.69
4562	128 bit static shift register	8.99
4566	Industrial time base generator	3.15
4568	Phase comparator/programmable counter	2.50
4572	Hex gate	.65
4573	Quad programmable op amp	3.43
4575	Quad programmable comparator	4.25
4580	4 x multiport register	6.49
4581	4 bit A/U	3.99
4582	Carry look ahead generator	1.75
4583	Dual Schmitt trigger	.95
4584	Hex Schmitt trigger	.75
4585	4 bit magnitude comparator	.99
4702	Programmable bit rate generator	11.99

Linear

109	1A + 5V regulator	.838
124	Quad op amp	.395
139	Quad comparator	.395
148	Quad op amp	.550
300	General purpose op amp	.410
301	General purpose op amp	.50
305	Voltage regulator	.1.15
306	Improved voltage comparator	.1.50
307	Op amp	.60
308	Super beta op amp	.75
309	+ 5V regulator	.1.69
310	Voltage follower	.3.38
311	Voltage comparitor	.1.50
317	3 terminal adjustable regulator	.3.40
318	Precision high speed op amp	.1.45
319	High speed dual comparator	.1.89
323	3A + 5V regulator	.5.19
324	Quad op amp	.58
337	3 terminal negative regulator	.1.75
339	Quad comparator	.55
348	Quad low-power 741	.65
350	3A 3 term positive adjust. regulator	.7.25
355	FET input op amp	.89
356	Monolithic J-FET input op amp	.1.95
357	Monolithic J-FET input op amp (uncompensated)	.2.50
358	Dual version of 324	.55
380	2W audio amp	.1.10
393	Dual version of 339	.60
398	Sample and hold amplifier	.5.94
555	Timer	.45
556	Dual timer	.1.10
558	Quad timer	.1.90
567	Tone decoder	.95
709	Op amp	.78
710	Differential comparator	.1.32
711	Dual channel differential comparator	.1.75
714	Precision op amp	.4.45
715	High speed op amp	.5.25
723	Voltage regulator	.1.00
725	Instrumentation op amp	.2.99
726	Temperature controlled differential pair	.65.25
727	Temp. controlled differential preamplifier	.72.95
733	Differential video amp	.1.15
739	Dual high performance op amp	.2.10
741		

Linear

1558	Dual op amp	2.99
1595	Four quad multiplier	7.78
1596	Modulator/demodulator	5.49
1800	Demodulator	6.25
1889	Video modulator	6.25
3900	Quad op amp	0.95
26LS29	Quad RS423 line driver	5.49
26LS30	Quad RS422/432 line driver	3.95
26LS31	Quad differential line driver RS422	2.70
26LS32	Quad differential line driver RS422	2.70
26LS33	Quad differential line driver RS422	3.95
3470	Floppy disk read amplifier	5.99
3486	Quad RS422/423 line receiver	2.59
3487	Quad line driver RS422	2.95
76477	Analog complex sound generator	5.00
76478	Analog complex sound generator c/w amp	6.90
76489	Microprocessor cont. complex sound generator	8.30
8T26	Quad tri-state bus transceiver	1.40
8T28	Quad tri-state bus transceiver	1.50
TL070	Low noise bifet op amp .....	.79
TL071	Low noise bifet op amp .....	.65
TL072	Low noise bifet op amp .....	.99
TL074	Low noise bifet op amp	1.90
TL075	Low noise bifet op amp	3.25
TL080	General purpose bifet op amp .....	.69
TL081	General purpose bifet op amp .....	.75
TL082	General purpose bifet op amp .....	.99
TL083	General purpose bifet op amp	2.50
TL084	General purpose bifet op amp	1.85
TL497	Switching voltage regulator	2.50
ULN2002	7 segment transistor array	1.00
ULN2003	7 segment transistor array	1.00
ULN2004	7 segment transistor array	1.00
XR200	Multifunction I.C.	67.75
XR205	Monolithic waveform generator	8.10
XR210	FSK modulator/demodulator	5.95
XR215	Phase lock loop	5.95
XR240	PCM repeater	11.95
XR320	Monolithic timing circuit	1.64
XR1310	Stereo demodulator	1.25
XR2206	Monolithic function generator	4.95
XR2207	Voltage controlled oscillator	2.75
XR2208	Operation multiplier	3.45
XR2209	Precision oscillator	3.45
XR2211	FSK demodulator/tone decoder	2.75
XR2212	Precision phase locked loop	6.92
XR2213	PLL/tone decoder	5.45
XR2240	Programmable timer counter	1.89
XR2242	Long range timer	2.25
XR2567	Dual monolithic tone decoder	2.40
XR4739	Dual low noise op amp	1.55
XR14412	FSK modem system	8.75

Memories

TOP VALUE

Untouchable Prices!

Guaranteed Prime Stock

Dynamic RAMs

4116 1x16k (150ns)	\$ 1.19
2118 1x16k (200ns) single + 5V supply	\$ 1.00
4164 1x64k (150ns)	\$ 3.49
4164's (150ns). Order 75 or more	\$2.99 ea.
41256 1x256k (150ns)	\$19.95

Special pricing for 50 or more

Static RAM

2114L 4x1k 200ns	\$ 2.25
6514 4x1k CMOS 450ns	\$ 4.99
6116 8x2k 150ns	\$ 8.99
(CMOS low power consumption)	
2016 8x2k 150ns	\$ 8.25
6164 8x8k 150ns	\$38.00

EPROMS

2716 450ns 8x2k	\$ 6.19
2716 300ns 8x2k	\$ 7.45
2732 450ns 8x4k	\$ 5.95
2732 250ns 8x4k	\$ 5.95
2764 300ns 8x8k	\$ 6.95
27128 350ns 8x16k	\$13.95

74LS00 Series TTL

74LS00	Quad 2 input NAND gate	39
74LS01	Quad 2 input NOR gate O/C	45
74LS02	Quad 2 input NOR gate	39
74LS03	Quad 2 input NOR gate O/C	45
74LS04	Hex inverter	39
74LS05	Hex inverter O/C	45
74LS08	Quad 2 input AND gate	39
74LS09	Quad 2 input AND gate O/C	45
74LS10	Triple 3 input NAND gate	40
74LS11	Triple 3 input NAND gate O/C	45
74LS12	NAND gate inverter	50
74LS13	Dual Schmidt trigger	50
74LS14	Hex Schmidt trigger inverter	75
74LS15	Triple 3 input NOR gate	75
74LS20	Dual 4 input NAND gate	45
74LS21	Dual 4 input NOR gate	45
74LS22	Dual 4 input NAND gate	45
74LS24	Quad 2 input NAND Schmidt trigger	75
74LS26	Quad 2 input positive NAND gate	45
74LS27	Triple 3 input NOR gate	45
74LS28	Quad 2 input NOR buffer	45
74LS30	8 input NAND gate	45
74LS32	Quad 2 input NOR gate	45
74LS33	Quad 2 input NOR gate O/C	45
74LS37	Quad 2 input NAND gate	55
74LS38	Quad 2 input NAND gate O/C	50
74LS42	BCD to decimal decoder	60
74LS47	BCD to 7 segment decoder/driver	90
74LS48	BCD to 7 segment decoder/driver	99
74LS49	BCD to 7 segment decoder/driver	95
74LS51	And/or invert gate	45
74LS54	4 wide and/or invert gate	45
74LS55	2 wide 4 input and/or invert gate	45
74LS63	Hex current sensing switch	1.70
74LS73	Dual JK flip flop with clear	55
74LS74	Dual D flip flop	49
74LS75	4 bit bistable latch	60
74LS76	Dual JK master/slave flip flop	99
74LS77	4 bit bistable latch	1.00
74LS78	Dual JK flip flop preset, common clear	55
74LS83	4 bit binary full adder	80
74LS85	4 bit magnitude comparator	1.15
74LS86	Quad input XOR gate	55
74LS90	Decade counter	69
74LS91	8 bit shift register	75
74LS92	Divide by 12 counter	69
74LS93	4 bit binary counter	69
74LS95	4 bit right/left shift register	80
74LS96	5 bit shift register async. preset	80
74LS107	Dual JK flip flop with clear	60
74LS109	Dual JK pos. edge triggered flip flop	60
74LS112	Dual JK edge triggered flip flop	60
74LS113	Dual JK edge triggered flip flop	60
74LS114	Dual JK edge triggered flip flop	60
74LS122	Retriggerable monostable multivibrator	90
74LS123	Dual retriggerable monostable multivibrator	95
74LS125	Tri state quad bus buffer	60
74LS126	Quad 3 state buffer	90
74LS132	Quadruple 2 input NAND Gate	89
74LS133	13 input NAND gate	70
74LS136	Quad XOR gate	60
74LS137	3 of 8 decoder/demultiplexer	99
74LS138	3 to 8 decoder/multiplexer	73
74LS139	Dual 1 of 4 decoder/demultiplexer	73
74LS145	BCD to decimal decoder/driver	1.00
74LS147	10/4 priority encoder	2.00
74LS148	8 to 3 line priority encoder	2.15
74LS151	8 channel digital multiplexer	69
74LS153	Dual 4/1 multiplexer	72
74LS154	4 to 16 decoder multiplexer	1.05
74LS155	Decoder/demultiplexer	99
74LS156	Decoder/demultiplexer	85
74LS157	Quad selector/multiplexer	70
74LS158	Quad 2 input multiplexer (inverting)	75
74LS160	Decade counter with async clear	99
74LS161	Sync. 4 bit counter	99
74LS162	Sync. 4 bit counter	99
74LS163	Sync. 4 bit counter	99
74LS164	8 bit serial shift register	99
74LS165	Parallel load 8 big shift register	1.30
74LS166	8 bit PLSD shift register	1.95
74LS168	Up/down decade counter	2.25
74LS169	4 bit sync. binary counter	1.49
74LS170	4 x 4 register file	1.95
74LS173	4 bit tri state register .....	.78
74LS174	Hex D flip flop with clear .....	.80
74LS175	Quad D flip flop with clear .....	.80
74LS181	4 bit ALU	2.95
74LS182	Look ahead carry	2.75
74LS190	Sync. up/down counter BCD	1.10
74LS191	Sync. up/down counter binary	1.10
74LS192	Binary up/down counter	1.10
74LS193	Binary up/down counter	1.10
74LS194	4 bit bi-directional shift register .....	.75
74LS195	4 bit shift register .....	.75
74LS196	Decade counter	1.50
74LS197	Presetable binary counter	1.05
74LS211	Dual monostable multivibrator	1.25
74LS240	Octal inverting bus driver	1.25
74LS241	Octal bus driver	1.25
74LS242	Quad inverting transceiver	1.20
74LS243	Quad transceiver	1.20
74LS244	Tri state octal driver	1.25
74LS245	Octal bus transceiver	1.50
74LS227	BCD to 7 segment decoder driver	1.05
74LS228	BCD to 7 segment decoder driver	1.35
74LS251	Tristate data selector multiplexer .....	.99
74LS253	Dual 4 bit multiplexer .....	.75
74LS257	Quad 2 input multiplexer .....	.80
74LS258	Quad 2-1 multiplexer .....	.80
74LS259	8 bit addressable latch	1.30
74LS260	Dual 5 input NOR gate .....	.89
74LS266	Quad 2 input XNOR O/C .....	.50
74LS273	Octal D flip flop	1.45
74LS275	7 bit slice Wallace tree	5.55
74LS279	Quad S-R latches .....	.59
74LS280	9 bit odd/even parity checker/generator	3.25
74LS283	4 bit binary full adder .....	.87
74LS289	64 bit RAM	6.25
74LS290	Decade counter .....	.90
74LS293	4 bit binary counter .....	.95
74LS295	4 bit shift register	1.50
74LS298	Quad 2 input multiplexer	1.12
74LS299	8 bit storage register	2.75
74LS300	Crystal oscillator	5.65
74LS321	Crystal oscillator	3.90
74LS322	8 bit shift register	6.95
74LS323	8 bit bidirectional universal shift	4.55
74LS348	8 to 3 priority encoder	2.75
74LS352	Dual 4 bit multiplexer	1.10
74LS353	Dual 4 bit multiplexer	1.10
74LS354	Data selector multiplexer	1.75
74LS355	Data selector multiplexer	4.75
74LS356	Data selector multiplexer	4.75
74LS357	Data selector multiplexer	5.95
74LS365	Hex bus driver tri state .....	.65
74LS366	Hex bus driver (inverted output) .....	.65
74LS367	Hex bus driver .....	.62
74LS368	Hex bus driver (inverted output) .....	.65
74LS373	Octal transparent latch	1.45
74LS374	Octal dual flip flop	1.45
74LS375	4 bit bistable latch .....	.65
74LS377	Octal D register	1.50
84LS378	Hex D register	1.85
74LS379	4 bit register	1.85
74LS380	Multi function octal generator	9.00
74LS384	8 bit multiplier	7.95
74LS386	Quad 2 input XOR gate .....	.50
74LS390	Dual decade counter	1.28
74LS393	Dual 4 bit binary counter	1.15
74LS395	Tri state shift register	1.25
74LS396	Octal storage register	2.75
74LS398	Quad D flip flop	2.75
74LS399	Quad 2 input multiplexer with storage	1.45
74LS629	Voltage controlled oscillator	3.30
74LS670	74LS37	1.75
74S00	Quad 2 input NAND gate	72
74S02	Quad 2 input NOR gate	72
74S03	Quad 2 input NOR gate O/C	75
74S04	Hex inverter	72
74S05	Hex inverter O/C	75
74S08	Quad 2 input AND gate	72
74S09	Quad 2 input AND gate O/C	79
74S10	Triple 3 input NAND gate	79
74S11	Triple 3 input NAND gate O/C	79
74S15	Triple 3 input AND gate	79
74S20	Dual 4 input NAND gate	72
74S22	Dual 4 input NAND gate O/C	79
74S30	8 input NAND gate	72
74S32	Quad 2 input NOR buffer	82
74S37	Quad 2 input NAND buffer	2.49

continued on next page



Exceltronix

74SXX Series TTL

74S38	Quad 2 input NAND buffer O/C	.249	74S162	Sync. 4 bit counter	5.75	
74S40	Dual 4 input NAND buffer	.99	74S163	Sync. 4 bit counter	5.00	
74S74	Dual D flip flop	.82	74S168	4 bit up/down sync. counter	7.44	
74S85	4 bit magnitude comparator	2.50	74S169	4 bit sync. counter	6.95	
74S86	Quad 2 input XOR gate	1.00	74S174	Hex D flip flop with clear	1.70	
74S109	Dual JK positive edge triggered flip flop	2.50	74S175	Quad D flip flop with clear	1.80	
74S112	Dual JK flip flop	1.00	74S182	Look ahead carry generator	3.75	
74S113	Dual JK negative edge triggered flip flop	1.25	74S189	16 x 4 RAM	4.50	
74S114	Dual JK negative dge triggered flip flop	1.45	74S195	4 bit parallel access shift register	2.99	
74S124	Dual VCO	3.95	74S196	Presettable decade counter	4.95	
74S132	Quad 2 input Schmitt trigger NAND	2.20	74S197	Presettable binary counter	4.95	
74S138	3-8 decoder/multiplexer	1.90	74S201	256 bit RAM	8.95	
74S139	Dual 2-4 decoder/multiplexer	1.90	74S240	Octal line driver	2.99	
74S140	Quad line driver	1.60	74S241	Octal line driver	2.99	
74S151	8 channel digital multiplexer	1.50	74S260	Tri-state data selector multiplexer	2.65	
74S153	Dual 4-1 multiplexer	1.50	74S283	Dual 5 input NOR gate	1.75	
74S157	Quad 2 input multiplexer	1.75	74S289	4 bit binary full adder	4.99	
74S158	Quad 2 input multiplexer	1.70	74S299	16 x 4 RAM	5.20	
74S160	Decade counter with async. clear	4.95	74S373	8 bit universal shift storage register	8.50	
74S161	Sync. 4 bit counter	4.95	74S374	Octal D latch	2.90	
					Octal D latch	3.50

Trim Pots

P.C. MOUNT MULTITURN TRIMMOTS
RESISTANCE
10 500 10K 200K
20 1K 20K 500K
50 2K 50K 1M
100 5K 100K 2M



\$1.65 ea.

TRIMPOTS
RESISTANCE
100 1000 10K 100K 1M
250 2500 25K 250K 2.5M
500 5000 50K 500K 5M

OPEN CASE 35¢ ENCLOSED CASE 85¢



CRYSTALS

IDMB40 (1A, 400V)	\$.69	32.768KHZ	\$1.50	10.24MHZ	\$2.99
2KBP02 (2A, 200V)	\$1.50	1.00MHZ	\$6.95	12.00MHZ	\$2.99
2KBP06 (2A, 600V)	\$1.50	1.8432MHZ	\$3.99	14.00MHZ	\$2.99
KBPC102 (3A, 200V)	\$2.25	2.00MHZ	\$3.99	14.318MHZ	\$2.19
KBPC106 (3A, 600)	\$2.25	2.457MHZ	\$3.99	16.00MHZ	\$2.29
KBPC602 (6A, 200V)	\$3.60	3.57MHZ	\$3.99	18.00MHZ	\$2.29
KBPC606 (6A, 600V)	\$3.99	4.00MHZ	\$2.25	18.432MHZ	\$2.29
100JB2L (10A, 200V)	\$5.99	5.00MHZ	\$2.75	20.00MHZ	\$2.75
100JB6L (10A, 600V)	\$5.99	5.017MHZ	\$3.99	17.43MHZ	\$3.99
250JB2L (25A, 200V)	\$6.50	5.068MHZ	\$2.99	22.118MHZ	\$3.99
250JB6L (25A, 600V)	\$6.99	8.00MHZ	\$2.10	48.00MHZ	\$3.99
		10.00MHZ	\$2.75		

TRANSISTORS

DEVICE					
2N697	.50	2N3391A	.45	2N3773	.99
2N2219A	.66	2N3394	.80	2N3819	.65
2N2221A	.40	2N3415	.28	2N3820	.85
2N2222A	.50	2N3440	1.10	2N3904	.28
2N2270	.50	2N3442	2.60	2N3905	.28
2N2369A	.56	2N3566	.85	2N3906	.28
2N2646	1.42	2N3568	.85	2N4062	.66
2N2906	.55	2N3638A	.85	2N4112	.28
2N2907A	.55	2N3642	.85	2N4123	.20
2N3053	.70	2N3643	.85	2N4124	.50
2N3055	1.60	2N3645	.85	2N4208	.67
2N3117	1.50	2N3703	.28	2N4222	1.99
2N3227	4.18	2N3704	.50	2N4248	.85
2N3250	.70	2N3705	.29	2N4250	.85
2N4339	.45	2N5771	.50	MPSA20	.30
2N4400	.25	2N5772	.45	MPSA55	.50
2N4401	.25	2N6028	.45	MPSU51	1.09
2N4402	.25	MJ802	4.50	MPSU56	.66
2N4403	.25	MJ2955	1.63	PN2222A	.25
2N4416	1.40	MJ4502	4.90	TIP29C	.70
2N4853	4.22	MJE340	2.50	TIP30C	.70
2N4856	1.90	MJE802	1.99	TIP31C	.70
2N4891	.65	MPF102	.55	TIP32C	1.10
2N5245	.75	MPS615	.50	TIP33C	1.60
2N5400	.30	MPSA05	.29	TIP34C	1.65
2N5457	.60	MPSA13	.30	TIP35C	3.50
2N5485	.65	MPSA14	.35	TIP41C	1.20
2N5770	.55	MPSA18	.35	TIP42C	1.10

We have a large selection of small signal and JFET transistors in stock.

DB Connector Series

DB9P Solder Tail Male	\$1.75	DB25P Flat Ribbon IDC Crimp Type Male	\$8.99
DB9S Solder Tail Female	\$1.75	DB25S Flat Ribbon IDC Crimp Type Female	\$9.99
DP9P Rght Angle PCB Mount Male	\$2.50	DB25 Flat Ribbon IDC Crimp, Economy M or F	\$5.95
DP9S Rght Angle PCB Mount Female	\$2.50	DB25 Shell (Economy Type)	\$0.95
DB9P Flat Ribbon IDC Crimp Type Male	\$5.75	DB25 Shell, High Quality	\$1.99
DB9S Flat Ribbon IDC Crimp Type Female	\$6.25	DB37 Solder Tail Male	\$4.25
DB9 Shell (Economy Type)	\$0.75	DB37S Solder Tail Female	\$4.25
DB9 Shell, High Quality	\$1.99	DP37P Rght Angle PCB Mount Male	\$7.75
DB15 Solder Tail Male	\$1.95	DP37S Rght Angle PCB Mount Female	\$8.95
DB15S Solder Tail Female	\$1.95	DB37P Flat Ribbon IDC Crimp Type Male	\$14.00
DP15P Rght Angle PCB Mount Male	\$2.95	DB37S Flat Ribbon IDC Crimp Type Female	\$14.95
DP15S Rght Angle PCB Mount Female	\$2.95	DB37 Shell, High Quality	\$2.95
DB15P Flat Ribbon IDC Crimp Type Male	\$7.95		
DB15S Flat Ribbon IDC Crimp Type Female	\$8.50		
DB15 Shell (Economy Type)	\$0.95		
DB15 Shell, High Quality	\$1.99		
DB25 Solder Tail Male	\$1.95		
DB25S Solder Tail Female	\$1.95		
DP25P Rght Angle PCB Mount Male	\$4.95		
DP25S Rght Angle PCB Mount Female	\$4.95		

Female Screen Lock Assemblies for DB Connectors \$2.49/Set

Mail Orders: 319 College Street, Toronto, Ontario, M51 1S2

Rectifier Diodes

1N4001 50V 1A	\$.10
1N4004 400V 1A	\$.10
1N4007 1000V 1A	\$.12
1N5403 300V 3A	\$.40
1N5404 400V 3A	\$.40
1N5406 600V 3A	\$.60

Switching and Signal Diodes

1N34A	\$.19
1N914	\$.5
1N4148	\$.5
1N4448	\$.5

Zener Diodes

1 Watt. All Values 25 cents each.

Volatages Available:
3.9, 4.3, 4.7, 5.1, 5.6, 6.2, 7.5, 8.2, 9.1, 10, 12, 13, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36.

SIP Resistor Networks

Part #	Pins	Common	Pin #	
6-1-XXX	6	1	0.79	
8-1-XXX	8	1	0.09	XXX = Value
10-1-XXX	10	1	0.95	

SCR's

2N5064	\$.75
2N6337	\$.55
TIC106D	\$1.45
TIC116D	\$1.99
TIC126D	\$1.99

TRIACS

TIC206D	\$1.55
TIC216D	\$1.99
TIC226D	\$1.99
TIC263D	\$4.50

OPTO

MCT2	\$1.99
MCT6	\$1.99
4N25	\$1.10
4N35	\$1.20
4N30	\$.90
4N33	\$.99
MOC3011	\$1.75
MOC3031	\$2.50
MOC3002	\$2.99
FND500	\$2.99
FND507	\$2.99
TIL313	\$1.95
TIL312	\$1.95
RBG-1000	\$5.99

Delta Ribbon Connectors

(Centronics Parallel Printer Connector)	
36 Contacts Plug (IDC) Flat Ribbon Crimp Type Male	\$8.95
36 Contacts Socket (IDC) Flat Ribbon Crimp Type Female	\$9.95
36 Contacts Chassis Mount female	\$6.95
36 Contacts Solder Cable Male	\$8.85
36 Metal Shell (for solder male)	\$2.95

Flat Cable Card Edge Connectors (Disk Drive Connectors)	
50 Pin Edge Connector (8" Drive)	\$5.95
40 Pin Edge connector	\$5.00
34 Pin Edge Connector (5½")	\$5.85
20 Pin Edge Connector (Hard Drive)	\$4.79

Quantity Discounts Available

Sockets

**High quality AMP IC Soldertail Sockets (Double Wipe Action)
1.5 cents per pin**

8 Pin...12c	20 Pin...30c
14 Pin...21c	24 Pin...36c
16 Pin...24c	28 Pin...42c
18 Pin...27c	40 Pin...60c

Quantity Discounts Available

Note: we also carry a cheaper brand of solder tail sockets at only 1 cent per pin.

Machined contact Solder Tail Sockets (RN)

	Tin	Gold
8 Pin	.80	1.29
14 Pin	1.30	1.90
16 Pin	1.40	2.10
18 Pin	1.90	2.75
20 Pin	1.90	3.10
24 Pin	2.40	3.80
28 Pin	2.70	4.30
40 Pin	3.80	5.80

Wire Wrap Sockets (RN)

8 Pin	\$1.20
16 Pin	\$2.20
18 Pin	\$2.40
20 Pin	\$2.80
24 Pin	\$3.25
28 Pin	\$3.90
40 Pin	\$4.95

AMP ZIF Lock Sockets

High Quality AMP	
16 Pin	\$12.95
24 Pin	\$14.95
28 Pin	\$16.95
40 Pin	\$18.95

Component Platforms

14 Pin	\$1.89
16 Pin	\$1.99
24 Pin	\$2.85
28 Pin	\$3.60
40 Pin	\$4.99

Two Row Right Angle Header Strips (Male)

40 Pin 20x2	\$3.45
34 Pin 17x2	\$2.80
26 Pin 13x2	\$2.45
20 Pin 10x2	\$1.95
16 Pin 8x2	\$1.40
10 Pin 5x2	\$0.95

Two Row Straight Header Strips (Male)

50 Pin 25x2	\$3.90
40 Pin 20 Pin 10x2	\$1.95
16 Pin 8x2	\$1.40
10 Pin 5x2	\$0.95

Female Header Strips

(Flat Ribbon Crimp Type Socket Connector)

50 Pin Female Header 25x2	\$4.99
40 Pin Female Header 20x2	\$4.35
34 Pin Female Header 17x2	\$3.20
26 Pin Female Header 13x2	\$2.95
20 Pin Female Header 10x2	\$1.89
16 Pin Female Header 8x2	\$1.95

Two Position Female Jumpers
(Shunts) 20 cents each

Wire Wrap Wire. All Colours (30 gauge)

25 ft.	\$2.80
50 ft.	\$5.00
100 ft.	\$8.95
Wire Wrap/Unwrap Tool/Strip Tool	\$16.25
Wire Wrap Gun and Bit	\$63.00

IC Extractor	\$3.99
IC Insertion Tool	\$18.95
High Quality 24-40 Pin Extractor	\$23.50

Capacitors

TANTALUM CAPACITORS

0.1uF 35V	\$.26	6.8uF 25V	\$.45
0.15uF 35V	\$.26	6.8uF 35V	\$.58
0.22uF 35V	\$.26	10uF 25V	\$.58
0.33uF 35V	\$.26	10uF 35V	\$.61
0.47uF 35V	\$.26	15uF 25V	\$.95
0.68uF 35V	\$.26	15uF 35V	1.79
1.0uF 35V	\$.27	22uF 25V	1.30
1.5uF 35V	\$.27	22uF 35V	2.25
2.2uF 25V	\$.25	33uF 25V	1.95
2.2uF 35V	\$.30	33uF 35V	2.49
3.3uF 25V	\$.35	47uF 10V	1.25
3.3uF 35V	\$.40	47uF 25V	2.70
4.7uF 25V	\$.40	47uF 35V	3.99
4.7uF 35V	\$.50	68uF 10V	1.90
6.8uF 16V	\$.40	68uF 25V	2.79

Other Values Available on Request.

Cable Assemblies

DB25 Male to DB25 Female \$35.00

RS232 Cable (6ft of round conductor) \$39.00

RS232 other lengths and connector configurations available on request.

Parallel cable 36 pin Centronics type connectors, male joined by 6ft of ribbon cable to female \$35.00

Parallel Cable for IBM interface DB25 through 6ft of ribbon to 36 pin centronics with appropriate connections \$35.00

Cable Assemblies for two 5-1/4in drives and controller (e.g. IBM) using three 34 pin connectors and appropriate length of 34 conductor cable \$35.00

20 pin Female header 24in. to 20 pin for Apple drives \$6.95

DIP HEADER ASSEMBLIES

Specification example: 14 pin-6 in. means two DIP's, 14 pins each, separated by a 6in cable.

14 pin — 6 in.	\$ 4.99
14 pin — 12in.	\$ 5.50
14 pin — 24in.	\$ 6.50
16 pin — 6 in.	\$ 5.50
16 pin — 12in.	\$ 6.00
16 pin — 24in.	\$ 6.95
24 pin — 6in.	\$ 9.75
24 pin — 12in.	\$10.25
40 pin — 6in.	\$14.00
40 pin — 12in.	\$15.50

Any length and configuration made on request.

DIP Connectors for Flat Ribbon Cable

14 Pin	\$1.80
16 Pin	\$1.99
24 Pin	\$2.90
28 Pin	\$3.90
40 Pin	\$4.99

Card Edge PC Mount Connectors

50 Pin Connector (used on Apple Boards)	\$2.45
62 Pin Connector (used on IBM Boards)	\$2.45
S-100 Connector (S-100, Z-80 Systems)	\$4.95

DIP Switches

4-position	\$1.30
6-position	\$1.55
8-position	\$1.75
10-position	\$1.85

Switches

Momentary push-button switches	\$0.99
Momentary push-button switches SPDT	3.95
On-Off Switch. SPDT	3.95

Ceramic

Ceramic Disc. Large Selection of Values

All 10 Cents each.

Note, when ordering these, specify what voltage you require. Mosts are available in 50V and 100V.

BYPASS CAPACITORS

Monolithic

0.1uF 50V \$0.13

Fifty of the above for \$6.00

We also have a wide selection of other values of these capacitors with a 50V rating, all 25 cents each or 50 for \$9.00

Good In-Store Stock of Electrolytic Capacitors

Special Quantity Discounts Available.

Resistors

We carry a full range of 1/4 Watt, 5% resistors...5 cents each.

Parts for your Modem

Small Speakers	\$1.84
600 ohm to 600 ohm (1:1) isolation transformers	\$9.95
Relay for your modem (HE21A10500) 5V	\$4.99
DAA1812 for Modem (Contains Built-In Transformer, relay and surge protector)	\$39.00

Heat Sinks

T0220	\$0.39
TO3	\$2.99

LEDS

Large LEDs	
T-1 3/4 (Normal Size)	
Red (General purpose)	\$ 0.25
Green (General purpose)	\$ 0.39
Yellow (General Purpose)	\$ 0.39
Red (Extra Bright)	\$ 0.59
Green (Extra Bright)	\$ 0.65
Yellow (Extra Bright)	\$ 0.65

Small LEDs (T-3/4)

Red	\$ 0.30
Green	\$ 0.35
Yellow	\$ 0.35

Rectangular LEDs 75 cents each

Bar Graph Display

8-Segment, (Red, Green or Yellow)	\$4.95
35 LED Matrix 2' or 3'	\$9.95

(Great for Digital Signs)

GREAT QUALITY BREADBOARDS

Ideal for Prototyping

1. Three strips for IC's, 5 power strips, 4 binding posts and a base plate \$39.95

2. Econo Type. Two strips for IC's, 1 power strip, 2 binding posts and a base plate \$26.15

3. Four strips for IC's, 7 power strips, 4 binding posts and base plate \$56.95

Designers Dreambox

Features

- Fully enclosed power supply
- ON/Off switch with indicator light
- Voltages +5V at 5A, +12V at 2A
+/- 12V at 0.5A adjustable 28 to 2 Volts at 1A.
- With Prototyping Bread-Board mounted right on the slim power supply box

All this for only \$149.00

Momentary Keyswitches

Selection of engraved numbers on caps from 0 to 9. Also blank caps. Each switch and cap \$0.99

Please specify clearly the number required and the number of each. Blank cap with switch and LED \$1.69

Exceltronix Spring Catalogue 1985 — 21



Exceltronix

Special New Products A must in the educational field!

Intelligent Switchbox

An interface for connecting up to 8 computers to a single printer. A must for any computer classroom situation or where computers outnumber printers. This intelligent Digital Switch interface will accept up to 8 computer RS232 inputs and will provide one RS232 output which plugs into the serial port of your printer. This interface can be selected by either manually by a switch or through software control. The option to print out can be made from any or all the computers including the option whereby the teacher can control and monitor the students' printer selection from the teacher's computer terminal. Connection between the selected computer and printer is totally transparent, as though it were a mechanical switch even though it is all done digitally. Since this digital switch has its own Z80A CPU microprocessor built in, along with software, it allows us to highly customize this unit to your exact needs. For example Priority Selection, Time Slots with time out and many other features totally unheard of and impossible to do with conventional mechanical switches which often cost as much or more than our unit.

Single unit \$399.00

Quantity discounts available. Any special customization available at extra but reasonable cost. We also have parallel Printer 8 to 1 switches available from **\$250.00** and up. We recommend our Serial switch wherever possible. We can prepare entire cable harnesses and make custom cable assemblies for all your needs at unbeatable prices. Try us!

Serial A or B or C Switch Box \$99.00

Quantity discounts available.

Contains 3 RS232 connectors and a switch which switches all lines between A and output connector A and output connector C or connector B and output connector C. Example Applications. Switch between Serial printer and modem if you have only one serial port or switch on serial port or printer between two printers. We make a wide range of Cable/Connector Assemblies for ourselves and for other leading companies. Let us do the same for you. We offer the most competitive quantity discounts — try us. Single quantity pricing for in-stock assemblies.

Note. We will make special cable assemblies to your request at reasonable prices, even single units. RS232 Cable (6ft of flat ribbon 25 conductors)

Digital Modem

DO YOU HAVE A PROBLEM? Lack of wires for two-way communications? Do you have a single coax cable between four floors of a building?

If the above holds true for you, as it may well do, if you wish to put equipment in some older Government buildings which were wired years ago, using a single coax to communicate between main frames and which may now be obsolete, you need our solution. If you want to communicate using RS232 between your computers and all you have is a single coax between rooms or floors or buildings, now you can do it without rewiring using our economical solution.

About a year ago we were approached by a Government agency asking if we could solve the problem described above. Well, we solved their problem economically, in fact it worked so well that they bought hundreds of units from us.

The Digital Modem consists of two boxes (approx. 6" x 4") and two wall adaptors. Now you can simply have the RS232 of your computer terminal or other devices plugged directly into one of our Digital Modem boxes (which has a wall plug adaptor to get its power) and you can run up to 800 feet over a single wire to another of our Digital Modem boxes (which again has its own CSA approved power supply) and you again plug in the RS232 DB25 connector to your equipment. Now you can communicate at 9600 Baud or faster (or slower) simultaneously in both directions using your existing single coax cable wiring.

Digital Modem Pair \$350.00

(Two Boxes and two adaptors)

Quantity Discounts.

It works perfectly!

All prices and specifications in this catalogue are subject to change without notice. Please follow our ads monthly in Electronics Today and Computing Now! Whatever market conditions exist, you will find our prices the most competitive in Canada.

Toronto Store: (416) 921-8941; Ottawa Store: (613) 230-9000

Designers Dreambox

Features

- Fully enclosed power supply
- ON/Off switch with indicator light
- Voltages +5V at 5A, +12V at 2A
+/- 12V at 0.5A adjustable 28 to 2 Volts at 1A.
- With Prototyping Bread-Board mounted right on the slim power supply box

All this for only \$149.00

Power Supply

Fully enclosed and attractively packaged power supply with power switch, power indication and power card. +5V at 5A, +12V at 2A, +12V at 1.8A, -12V at 0.5A.

\$69.00

Boschert Switching supply attractively packaged along with RFI filter, switch and power cord. Outputs +5V at 6.5A, +15V at 3.5A, -15V at 3.5A. (can be easily modified to provide 12V at 3.5A using a 78H05 on the +15V). Unbeatable offer at **\$169.00**

KEPCO POWER SUPPLIES

Rated at 90W Max.!

RFI filter and fuse on board,
115/230V

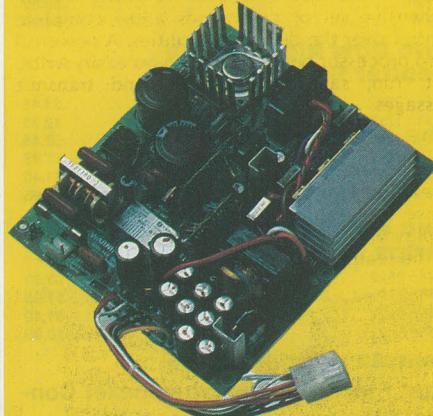
Open Frame \$ 49.00

Cased with no fan \$ 69.00

Cased with powerful 3" silent fan \$99.00

Cased Dual Unit 150W . \$149.00

Quantity discounts available.
Dealer enquiries invited.



Hydro approved. Cased version is designed so that the fan draws the air from inside of the system, through the power supply box and out. Beautifully quiet, switching power supply.

RATINGS

- 5V at 5.0A
- 12V at 2.8A
- 12V at 2.0A
- 12V at 0.5A

Documentation and schematics are provided with each KEPCO power supply. Ideal for 8088 and other IBM Compatibles and Apple and compatibles. Will handle up to 4x5 1/4" disk drives with power to spare.

Versadigital Signs

Every business needs attention. In today's competitive marketplace you need to get the customers' attention and you need to get your message across - as boldly and as dynamically as possible.

Two versions are available, single and double row. Each row holds up to 21 standard characters and can be expanded to up to 42 characters. The LED (Light Emitting Diode) display is available in red (standard or extra bright), green and yellow. Standard, wide (2", upper and lower case) and bold tall (4", upper case) come with the display. All can be displayed normally or in inverse (black characters on a lit background) image format. You can even program your own characters and graphic symbols. As well as the standard LED display, larger, brighter incandescent light bulb displays can be built to your specifications. All programming features are retained, and the standard LED display is included for ease of programming.

A wide variety of features allow you to catch the public's attention — choose from Wipe-On and Wipe-Off, Spell-On, Flash and Blink, Shift left and right, Scroll up and Down — in any order and at individually selectable speeds.

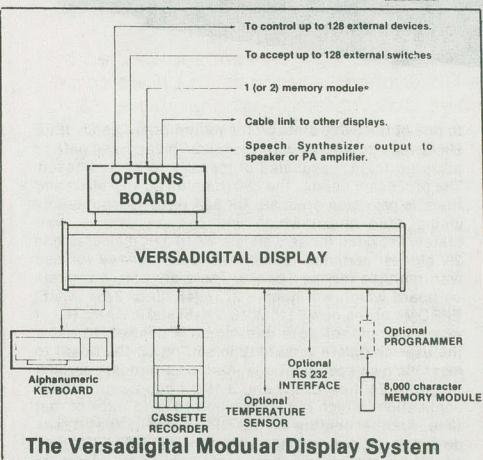
Up to six different events can be displayed simultaneously within dynamically selectable boundaries. Up to 128 labelled messages can be stored within the unit's memory for display at any preselected time and date and in any order. 12,288 character memory is standard on the Versadigital Display. This can be expanded to 36,864 with optional external read only memory modules.

Text can be entered through the Display's own keyboard, from an ordinary cassette recorder, from optional external memory modules, or optionally over telephone lines, radio or infra-red link or over AC wiring. A comprehensive set of commands allow complete control over the display's facilities. A powerful word processor type editor lets you easily write, edit, run, save (on cassette) and transmit messages.

The Sign That Can Sell Your Product

Research has shown that digital displays can increase sales by up to 30%. The Versadigital Display virtually assures that figure by increasing the readers' involvement. An optional inter-

The sign that also talks



The Versadigital Modular Display System

face allows up to 128 switches to be connected to the Display, enabling customers to select specific messages without having to wait for the sign to cycle through its repertoire.

The optional External Accessory Interface allows you to write messages that actually point to the product being discussed. At selected points within your message you can program the Display to turn on an external light or a bell. Thus your message might be saying "You won't find these shoes anywhere else . . ." and the Display will then activate a lamp highlighting the product. Up to 128 external devices can be controlled in this fashion. This feature alone makes the Versadigital Display the most effective sales tool you can have.

Versadigital Technology in conjunction with Multiflex Inc. also manufactures Time and Temperature displays and can build dynamic plaza maps to your specifications. Our extensive engineering experience enables us to design to a wide variety of situations. Whether it is modifying a current product, or designing new equipment, tell us what you need, we can deliver!

All prices in this catalogue are subject to change without notice.

Distributed by Digi-media Inc.
335 Evans Ave., Toronto, Ont. M8Z 1K2
(416) 252-9341



Versadigital signs are in use throughout the Toronto subway system. Send for reprint of article in Computing Now!, July 1984.

Exceltronix Index

6809 Computer	17
Apple and Compatible Products	
128K Card	11
16K Card	11
80 Column Card	11
Accessories	14
Disk Drives	10, 15
EPROM Programmer	11
Floppy Card	11
Modem Cards	11
Parts	12
Printer Interface Card	11
Serial Card	11
Z80 Card	11
Apple Computers	10
Books	16
Bridge Rectifiers	20
CMOS	18
Cable Assemblies	21'
Capacitors	21
Cases	12
Crystals	20
DB Connectors	20
DIP Headers	21
Delay Lines	12
Digital Modem	22
Digital Signs	23
Diodes	20
Disk Drives	10, 12, 15
EPROM Emulator	13
EPROM Erasers	13
EPROM Programmers	6, 11, 12
Edge Connectors	21
Electronic Components	20, 21
Excel Computers	10
Floppy Diskettes	15
Hard Drives	12, 15

IC and Compatible Products

A-D and D-A Card	7
Accessories	14
BEST Computers	5
Bubbly Memory	7
Colour Graphics	6
Compatible Computer	4
Computers	4
Disk Drives	12, 15
EPROM Programmer	6
Expansion System	4
Floppy Controller	6
Memory Expansion	7
Modem	4
Monochrome Card	4
Parallel Port Cards	6
Parts	12
Pentaram	7
Peripheral Cards	4
Printer Cards	6
Prototyping Board	7
Quanta Board	7
Real Time Clock	6
Tape Drive Backup	5
IC's	18
Joysticks	15
Keyboard Encoder	12
Keyboards	12, 14
LEDs	21
Linear IC's	18
Logic State Analyzer	13
Memory Chips	12, 19
Microcomputers	4, 10, 17, 24
Microprocessor Chips	18
Modem Parts	21
Modems	4, 11, 14, 22
Monitors	4, 12, 15
Multiflex Z80A	24
Music Keyboards	9
Opto Devices	20
Paper	8, 15
Power Supplies	22
Print Wheels	8
Printer Interfaces	14
Printer Switchboxes	22
Printers	8
Resistors	21
Ribbon Cable	20
Sockets	21
Software	16
TTL	19
Terminal	17
Transistors	20
Triacs	20
Trim Pots	20
U of T Computer	17
XL Electronix Computer Music Centre	9
Zener Diodes	20



Exceltronix

Multiflex Z80A

S100 Starter System

**Complete,
assembled
and tested**

TOP VALUE

\$299

Options:

64K Dynamic RAM & Multi- plexers	\$39.00
Big Piggyback Board with RS232 and Real Time Clock	\$179.00
RS232 Option for Mother- board	\$38.00
DC to DC Converter Option	\$29.00
Extra S-100 Connectors (each)	\$5.95

MULTIFLEX's Z80 computer is a versatile and expandable stand-alone computer system designed and built right here in Canada. It uses the newest technology to provide the user with the most capabilities for the smallest price-tag. Its adaptability to any situation and extremely low cost allow it to be used in many applications ranging from a trainer to a complete CP/M-based computer comparable to the best on the market, at a fraction of the price.

The actual layout of the system is a two board design. One board (the "motherboard") contains a 24-line parallel I/O chip for interfacing to the external world, an RS232C serial port with baud rates selectable from 110 to 9600 baud, a hex address and data display, a hex keypad, 14 monitor function keys, 2 user definable keys, a 40-chip wire wrap area with full access to all the bus signals, on-board provision for regulators so that the board can be supplied with standard S-100 voltages, an EPROM programmer which will handle 2708 (1Kx8), 2716 (2Kx8), 2732 (4Kx8) 2532 (4Kx8), 2764 (8Kx8) and the brand new 27128 (16Kx8) EPROMs, a DC-to-DC converter to supply the programming voltage to the EPROM programmer and four (4) slots for IEEE S-100 compatible boards for further expansion. This is an extremely useful and important feature as it allows expansion of the system with all boards using this industry-standard bus structure, which are available from MULTIFLEX, as well as from hundreds of manufacturers worldwide.

The other board is the CPU card. This card plugs in-



to one of the S-100 slots on the motherboard and is IEEE 696/S-100 compatible with the full 24-bit address path to allow up to 16 megabytes of memory to be addressed. The processor used is the Z80 (running up to 6 MHz) and there is provision on-board for 64K of dynamic memory (using 4164 chips) which will operate without wait states. Provided for as well is a 2K to 32K (selectable in 2K blocks) common resident area in memory for use with multiple memory banks. There are also 4 sockets on board which will handle 2732 (4Kx8) or 2764 (8Kx8) EPROMs or the new 6116/2016 (2Kx8) static RAMs (all of which can be software deselected if desired) to allow the user complete versatility in setting up the board to meet his own specifications. Also on board is 1 parallel port with 24 lines of I/O and 3 16-bit counter/timers for applications which require the unit to keep track of real time. Another feature of the CPU board is that it was designed by our engineers to run the CP/M 2.2 disk operating system so that if a floppy disk controller board is added to the system a fully configured CP/M machine can be set up for a very low cost as described on page 13.

The monitor software that comes with the kit is a well-written extensive package which allows the user to have complete versatility in machine language programming and execution as well as control of all the features on the board. The monitor functions include: examine/modify memory locations, memory block moves, compare 2 blocks of memory, examine CPU register, ex-

amine I/O ports, load and save from cassette calculate relative branch offsets, set breakpoints single step programs, execute programs, and program EPROMs. Each of these process is invoked by a single keypress. Also available to the user are 2 spare keys definable for special functions as required by specific applications and applicator programs.

Available as an option, there is a piggyback board which attaches to the CPU board and give the user a real-time/time-of-day clock with battery back-up, memory management for up to 16M of memory in 4K blocks, 2 RS232C ports which have independent software selectable baud rates, vectored interrupts for the onboard I/O and clock devices, and a general interrupt controller designed to handle multiple interrupts for up to 7 other boards.

All these features make this a very impressive stand-alone unit and, when combined with the S-100 boards either from the MULTIFLEX line or from other manufacturers, give the user the potential for a very powerful microcomputer system.

The standard kit includes the CPU board with a Z80A (4MHz) processor, 2K of RAM (a 6116), and 4K of EPROM (a 2732) as well as the motherboard with all the features mentioned above except the RS232C port and the DC-to-DC converter. Also supplied are sockets for all IC's and 1 S-100 connector.

Multiflex S-100 Video Board

This board is an intelligent, I/O mapped, 80 x 24 Video Display Board. Based on the 8275 programmable CRT controller, the 8257 programmable DMA controller, and a Z80 processor. Provided on board is 8K of static RAM which gives the user 3½ screens of text. With simple commands, the user can easily scroll around in this buffer, clear the present page and home, home on the present page and go to the beginning of the buffer. There are also 4 field attributes (blink, reverse video, underline, and highlight) which can be turned on and off by software. Other software commands include a carriage return, line feed, clear to end of line; transmit cursor location; transmit character at cursor location; position cursor; disable control functions; reset control register; as well as all the standard functions such as tab return, line feed, and backspace. Also included in the software is a debug/setup program which completely tests the board and allows the user to set up various parameters on it. The output from the board is in either composite video or a video signal with separate horizontal and vertical sync signals (either normal or inverted).

\$199.00

Multiflex S-100 Floppy Disk Controller

The MULTIFLEX floppy disk controller is a state-of-the-art IEEE 696/S-100 compatible board. It allows the user to interface, simultaneously, up to four (4) 8 inch or 5¼ inch disk drives in any combination to his system with the flexibility of single/double sided and single/double density operation. If desired, all operations with the optional on-board controller or under processor control. Latest technology has been used in this design. The board is designed around the FD2793 controller chip for easy use under any operating system. However, this board is especially designed for easy use with the CP/M or MP/M operating system (available as an option) and the MULTIFLEX Z80 computer kit. With all these features and its reasonable cost, this board is one of the best buys in a floppy disk controller board on the market today.

\$199.00

DMA Option **\$100.00**

MULTIFLEX 256K RAM CARD

- Provides user with upto 256K of Dynamic RAM.
- Uses 4164 150ns. • Refresh of RAM can be handled externally (if Z80 processor is available or internally if no refresh signal is available. • Waitstates can be jumper selected. • Compatible with CP/M and MP/M operating systems. • Bank select feature. • Write protect option.

Complete RAM CARD with 64k of RAM — \$199.00

128k — \$225 256k — \$275.00

MULTIFLEX S100 64K STATIC RAM CARD

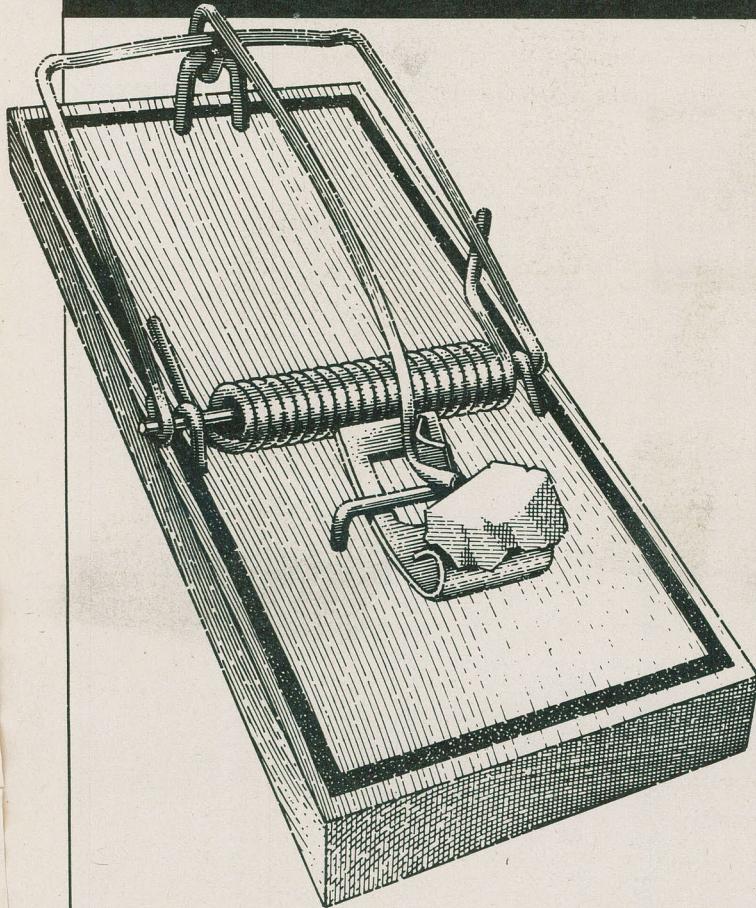
- Uses 2k x 8 static RAM chips. • Static RAM eliminates problems with refresh. • Optional provision for battery back up provides you with ideal way to store data even when the power is turned off.

Complete board with

16k RAM — \$159

32k RAM — \$199 64k RAM — \$299

The CP/M Disk Destroyer



If you find yourself with a bit of a meaty disk budget you'll probably be more than just idly concerned as to which brand of floppy can be expected to keep the BDOS errors at bay for the longest time. Here's a simple routine to test sample floppies until they cave in.

by Steve Rimmer

This is the April edition and I know that if I were looking at this thing kind of casually I'd think it was a joke. I mean, this program purports to be a very elaborate bit of code to brutally destroy disks.

There are people who will get into this just for its own sake. These are the same characters that go out on Friday nights and tie the tails of Hondas together, send two hundred and fifty dollars worth of pizza to Brian Mulroony and hire kids to go paint white lines on the lake... ya, they're fairly warped. However, aside from the obvious entertainment value... for heads that are easily entertained... the Mouse Factory Semi-Automatic Disk Destroyer is a very useful piece of software.

The trick, you see, is not to destroy the disks but, rather, to see how hard it is to destroy them. If you use a lot of disks and are

on first name basis with the BDOS error message, the quality of the mylar you're jamming into your drives will be of some concern to you.

The Disk Destroyer provides one with a moderately scientific way of determining how long differing brands of floppy disks can be expected to last. It subjects whatever it's run on to a fairly gruelling... if boring... series of disk accesses until it snaps under the awesome pressure.

Inasmuch as the program keeps a running count of the number of times it has accessed the disk the status of things at the instant of dissolution should be peering at you from the tube when the crash comes.

Rat Traps

The Disk Destroyer is written in assembler using the BIGMAC macro library to keep the complex stuff down to a manageable hugeness. As such, you will need the aforementioned library... brought up to date through recent editions of Computing Now!... and MAC, rather than ASM, to get it happening.

The operation of the program is fairly simple. It reads in a specific track and sector of the disk it is residing on, as defined by the equates at the top of the listing. Because many BIOS's are reasonably clever, and won't actually access the disk twice if you have them read the same sector twice in succession, we'll also have it read track one sector one between each read of the sector under scrutiny.

The BDOS, as you may have noted in looking at the Digital Research manuals, lacks any way at all of manipulating the disk drives at the track and sector levels. None of the BDOS functions, the stuff you get at by calling location five, are the least bit of good in this respect. You can get it together, however, by using the BIOS.

In most cases the CP/M BIOS exists only for the use of the operating system itself. However, it can be accessed by other programs. Although each BIOS is unique... as is the hardware it is designed to support... there is a standard jump table at the beginning of the BIOS which is fairly mellow. You can work with this little fruit and, more to the point, you can find it programmatically.

The first part of the BIOS is simply a table of jumps into the rest of the code. The jumps are in a predictable order and, as such, can be handled by other programs. We can, in fact, copy these jumps into a table within another program and have our own local BIOS jump table complete with labels.

The VECTOR macro gets all this together. You can see how it works in the November 1984 edition of Computing Now!... it is used in all its stunning glory in the Electric Disk Troll.

Having read in a sector the program computes a checksum for it. Checksums sound really high tech and mathematical... there must be an algorithm in there... but actually that one means it's adding all the bytes in the sector together. The object of the exercise is to detect when two successive reads of the same sector turn up with different data... the sure result of a disk gorch. As this would cause the bytes of the sector to have different numerical values the checksums wouldn't match.

It's a lot simpler to compare two single byte checksums than it is to handle two one hundred and twenty-eight byte strings.

The DOSEC routine reads in the sector and computes the checksum. It also waits between each access... as things are set up here it will pause for about one second. You will probably want to shorten this time somewhat. The value loaded into B about five lines after CHKLP determines the number of tenths of a second between accesses.

The CP/M Disk Destroyer

```

; KILLKILLKILLKILLKILLKILLKILLKILLKILLKILLKILL
;
;           Mouse Factory Semi-automatic
;           Floppy Disk Destroyer
;
;           Copyright (c) 1985 Steve Rimmer
;
;           Contains no artificial preservatives
;           ... rots completely naturally
;
; KILLKILLKILLKILLKILLKILLKILLKILLKILLKILLKILL

MACLIB BIGMAC
MACRO ;SYSTEM UNSPECIFIC SCREEN CLEAR
LOCAL LOOPP
PRINT CR
MVI B,25
PRINT LF
DCR B
JNZ LOOPP
PRINT HME
ENDM

DEFINES
EQU 0003H ;TRACK TO TEST
EQU 0003H ;SECTOR TO TEST
EQU 4 ;CLOCK SPEED IN MEGAHERTZ

ORG 0100H ;SET UP STACK

BLANK ;CLEAR SCREEN
PRINT <CR,LF,TAB,TAB>
PRINT 'Mouse Factory Destructive Floppy Disk Tester V
PRINT <CR,LF,TAB,TAB>
PRINT '::::::::::::::::::::::::::::::::::
PRINT <CR,LF,TAB,TAB>
PRINT 'Copyright (c) 1985 Steve Rimmer'
PRINT <CR,LF,'Tests floppy disks to destruction '>
PRINT '<by repeatedly accessing'>
PRINT <CR,LF,'the same track and sector until '>
PRINT '<the little troll snuffs'>
PRINT <CR,LF,'it. Use with very cheap disks '>
PRINT '<for maximum satisfaction.'>

PRINT <CR,LF,LF,LF,LF,LF,LF,LF,LF,LF,LF>
PRINT 'Hit any key to start the ordeal'

CONIN ;GET KEY PRESS
VECTOR ;SET UP VECTOR TABLES

BLANK ;CLEAR THE TUBE AGAIN
CALL DOSEC ;GET THE INITIAL CHECKSUM
STA CHECK ;AND INITIALIZE THE BUFFER

LHLD ACCESS ;GET THE NUMBER OF ACCESSES
INX H ;BUMP IT UP
SHLD ACCESS ;AND STASH IT

XRA A ;ZERO A
CMP H ;SEE IF HIGH ORDER OF ACCESSES IS 0
JNZ NOCYC ;IF NOT, WE HAVEN'T WRAPPED
CMP L ;SEE IF LOW ORDER OF ACCESS IS 0
JNZ NOCYC ;IF NOT... YEP, CARRY ON

LHLD CYCLE ;BUMP UP
INX H ;CYCLE COUNTER
SHLD CYCLE

PRINT <HME,'
PRINT <HME,'Cycle: '>
DECOUT CYCLE ;SHOW THE CYCLE COUNT IN DECIMAL
PRINT <'          Access: '>
DECOUT ACCESS ;SHOW THE ACCESS COUNT IN DECIMAL
PRINT <CR,LF,LF,LF,LF>

CALL DOSEC ;GET SECTOR AND CHECKSUM

LXI H,CHECK ;POINT TO CHECKSUM STASH
CMP M ;SEE IF THEY MATCH
JNZ CHKERR ;IF NOT, WE HAVE A WINNER
MOV M,A ;UPDATE CHECKSUM
PRINT <'Checksum: '>
DECOUT CHECK ;SHOW THE CHECKSUM
JMP BIGLP ;AND HIT IT AGAIN

```

```

CHKERR PRINT <CR,LF,LF,LF,LF,LF,'Checksum error. The jig is up.'>
      JMP QUIT
DISKER PRINT <CR,LF,LF,LF,LF,LF,'Disk read error. The jig is up.'>
      JMP QUIT

ACCESS DW 0000H ;ACCESS COUNT STASH
CYCLE DW 0000H ;CYCLE COUNT STASH
CHECK DW 0000H ;CHECKSUM STASH
      |

DOSEC: ;SUCK IN A SECTOR AND CALCULATE CHECKSUM
SETDMA 0080H ;SET UP DMA BUFFER
LXI B,1 ;RESET TRACK AND SECTOR
CALL TRACK
LXI B,1
CALL SCTOR
CALL READ
LXI B,TTRK ;SELECT CHOSEN TRACK
CALL TRACK
LXI B,TSEC ;...AND SECTOR
CALL SCTOR
CALL READ ;AND READ IT
CPI 0 ;SEE IF WE BIT THE
JNZ DISKER ;DUST

MVI B,128 ;GET LENGTH OF DMA
LXI H,DMA ;POINT TO DMA BUFFER
XRA A ;ZERO A
CHKLP ADD M ;ADD EACH BYTE (TO HELL WITH
INX H ;THE CARRY)
DCR B ;...AND LOOP
JNZ CHKLP ;'TIL WE'RE DONE

MVI B,10 ;WAIT 1 SECOND
CALL WAIT
RET

WAIT ;WAIT FOR .1 SEC * B
PUSH PSW
WAIT1 PUSH B
LXI B,2083 * CLOCK ;FUDGE FACTOR
WAITL DCX B
MOV A,B
ORA C
JNZ WAITL
POP B
DCR B
JNZ WAIT1
POP PSW
RET

QUIT EXTR 60 ;CREATE STACK AND REFUDGE

```

Bite the Bullet

The results of using this ravenous little troll can be quite revealing. In some preliminary... and, admittedly, only marginally well controlled... tests we found, for example, that generic white label disks died almost before the program was booted. Actually, some of them croaked when I was copying the destroyer onto them... they knew what was coming and took the honourable way out.

The better disks... the ones that actually have brand names you've heard of... fared considerably better. We'll probably publish the results of all this destruction in a future edition when we're sure that the cleaners aren't sneaking in during the unseen hours and having at the things with nail files.

I generally buy disks for many of the wrong reasons. For example, I have a lot of Elephants because I can imagine what an elephant looks like. None of the zoology books in the library have listings for either Memorexes or Dysans. The former sounds vaguely like some sort of giant snail. I don't think I want a lot of giant snails around the house.

Elephants, on the other hand, can be tethered in the yard. If you buy the really clumsy ones they serve to keep the cat population down to a manageable hugeness, a decided advantage. In a pinch an elephant will provide one with ready transportation which no one will dare honk at. Finally, it is true that they never, ever forget anything. However, being fairly thick, they rarely have anything to forget. It's a questionable talent. **CN!**

dana's

● computer discount

DISKETTE DISCOUNT

AS LOW AS

90¢

EA.

5 1/4" COMPLETE WITH JACKETS

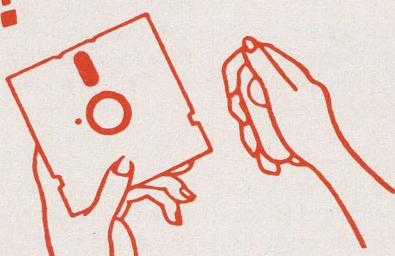
SSDD	1000 Diskettes	.90 ea.
SSDD	100 Diskettes	1.00 ea.

DSDD	1000 Diskettes	1.30 ea.
DSDD	100 Diskettes	1.50 ea.

Diskette Offer Expires April 30, 1985

NEW!!

DISK
DOUBLER



DOUBLES DISKETTE
STORAGE SPACE

DOUBLES DISKETTE STORAGE SPACE!!!

- Unique Position Guide Assures Accuracy
- Square Notch Cut
- Easy Leverage Handle
- Enamel Finish
- All Metal Compact Design

ONLY \$9.95



We accept Certified Cheques, Money Orders, Bank Transfers, C.O.D.s, VISA and Mastercard. VISA and Mastercard add 3%. Cheques require bank clearance. All orders shipped Freight Collect. All subject to availability, acceptance and verification.



All sales final. Prices subject to change without notice. Orders normally shipped within 48 hours of payment.

Quality Products
and Services
Discount Prices

dana's computer discount
P.O. Box 6295, Station C
Edmonton, Alberta, Canada
T5B 4K6 Tel: (403) 429-4718

Circle No. 10 on Reader Service Card

Some New Calls from Bell

In the next few years your phone rates will probably increase and Bell may put in a few hooks to make itself a lot less attractive to computer users. Here's a look at some of the proposed changes.

By Sonia Brock

A change in the way we use the telephone system is approaching a little more swiftly than some of us might wish. More to the point, unless you spend your time watching the bottom feeders of the communications bureaucracy, you probably don't know a thing about it. However, what it will probably mean to you... especially if you use the phone system with your computer... is potentially higher costs for some types of telecommunications and more restrictions on the use of Ma Bell's wires.

Many of the changes which the minions of Bell are even now working to put in place are a result of the recently changing nature of the way in which people use their phones. The billing structure which was in place ten years ago... one which all concerned were fairly comfortable with... had been in existence, largely unchanged, for half a century.

With the advent of large scale computer communications and other technological innovations which have largely descended on an otherwise unsuspecting phone company, Bell is looking to change the way it charges us for what it does.

Pay Phones

While the changes that Bell is looking at are complex, the basic effects on its subscribers if it is given its way will be pretty easy to understand. Telephone costs will go up and the once universal flat rate for home users of the phone service will disappear.

Long distance charges have in the past cross subsidized local rates, as has the leasing of equipment such as home phones. In other words, you've been getting a break on your monthly bill, which was paid for by overly high long distance charges.

Bell is now facing competition from CNCP on long distance rates, a competitor that does not have an expensive and aging local plant to maintain. Bell also has to compete with inexpensive telephone receiver imports... you don't have to have a Bell phone anymore.



Cantel may have the edge in a very promising new market called "cellular radio telephones" which, with the use of computer controlled relays, allow for private mobile phones.

There are also satellite linkups and local area networks to account for. These involve a large percentage of the money that business spends on telecommunications, and will probably involve a lot more as these still infant industries grow.

With all these things eroding Bell's income, it is also looking at a number of things which have the potential of increasing its operating expenses considerably as well. The use of computer communications on the common carrier is certainly one of these. An individual with a computer and a modem typically makes a lot more use of... and demands on... the phone system than does an individual with nothing more than a phone.

The existing hardware of the phone system is presently being stretched to accommodate the demands which are being placed on it, demands which are still growing.

Bell's answer to all of this imminent doom is an initially frightening concept which they call "local measured service", or LMS. This means that individual users of the phone system would be paying for local calls in a manner similar to the way in which we already pay for long distance service.

This change probably will come to pass... we'll likely see it within the next five years. However, as unpleasant as it may seem, it is a solution to a real problem. The other alternatives, like a financially unsound... and technically inefficient... phone system are rather less appetizing.

In the meantime Bell Canada is talking very seriously about increasing their local phone rates. They have an application for interim relief and in the fall of this year they will be applying for a general rate increase.

I'm told that Bell would like to see an increase of twenty percent over the next five years. If they're granted the right to get it, there are a number of ways it might be reflected in the phone bills they subsequently send out.

There may be a straight increase in the phone rates amounting to twenty percent

spread over five years. However, they might charge residential phone users by the call. This is being done in parts of the United States. Finally, they might introduce a locally measured service, in which the bill is based on the time one spends on the line.

The Meter is Running

LMS has existed, in one form or another, under one name or another, for some time in the United States. Forty-two states, at last count, had LMS either on a trial basis or permanently. Bell has the capability to do such measuring right now and has had it for some time. In electronic switching centres the measurement of calls can be implemented by a simple change in software.

Let's assume that the charges on your phone billing have become what Bell called "unbundled". You are allowed a certain number of local calls of limited duration per month. Any calls over this set number are extra at a rate of perhaps four cents a minute or a bit more or less depending on where you are calling and whether or not you call in off peak hours.

Charging more for phone service during "peak hours" is intended to persuade users to spread their use of the system out more. Obviously, the phone system needs to be large enough to handle the peaks... Bell would very much like to see smaller peaks.

While a locally measured service sounds a bit Orwellian, it has a few advantages. Bearing in mind that the phone rates are going to go up in any case, it offers users the potential of having some control over the sizes of their phone bills. Long distance rates may actually decrease, as they won't be responsible for subsidizing the local phone systems as much.

All long distance calls do originate locally but advances in technology make the transmission of a local call cheaper over distance.

All of this will, of course, affect the way we use computers and telephones. Twelve hundred baud modems, for example, would become almost essential for users with locally measured service. One would also expect the casual use of bulletin boards as a form of recreation diminish... it might be extremely expensive entertainment.

Bell feels that a typical residential telephone call lasts for four minutes or less. Anything beyond this is "excessive" use of the system.

CN!

APPLE and MACINTOSH OWNERS! JOIN Logic

CANADA'S LARGEST NON-PROFIT APPLE COMPUTER USERS' GROUP

Searching for public domain software? Members receive a catalog of over 200 low-cost disks crammed with APPLE II programs and an expanding selection of MACINTOSH programs.

As a member, you also receive MAPLE ORCHARD, LOGIC's informative computing magazine.

Do you have a special interest? LOGIC's many Special Interest Groups provide user support in a number of specialized areas of computing.

As a service to members, LOGIC regularly offers special prices on hardware and software.

LOGIC monthly meetings feature guest speakers, technical forums and software/hardware demonstrations.

And LOGIC maintains a superb Bulletin Board with free access for members.

Expand your horizons! Just \$30 a year.

LOGIC
DEPT. C

P.O. BOX 696, STATION B
WILLOWDALE, ONTARIO,
CANADA M2K 2P9 (416) 881-8120
Circle No. 14 on Reader Service Card

TORONTO RCP/M SYSTEMS is now CANADA REMOTE SYSTEMS

9 Remote access systems.
\$30 per year access charge. Datapak available. 150 Megabytes online. 24 hour service.

30,000 Programmes available by mail. From \$10 per disc. For over 200 CP/M, MSDOS and IBM computers.

Full line of commercial software and modems

416-239-2835

For a free mini-catalog, to join or to order:

CANADA REMOTE SYSTEMS

Circle No. 12 on Reader Service Card

This Month In

Software Now!

DBase III

An in-depth review of one of the most popular data base packages available for microcomputers.

Crossword Magic

Tired of doing everyone else's puzzles? Check into this nifty crossword generator that lets you create your own word teasers.

By The Boards

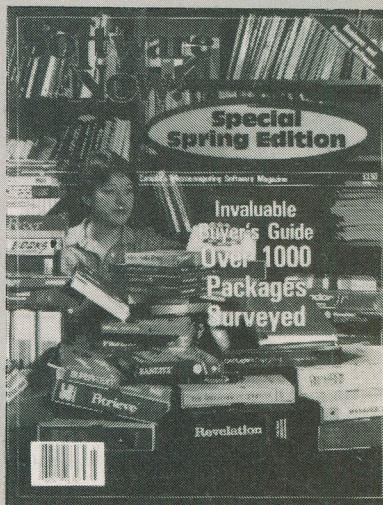
SN!'s regular look at what's happening on the bulletin board scene.

Arcade

A look at some of the popular micro entertainment software. This month they reveal Hitchhiker's Guide to the Galaxy, Dam Busters, Airport, and Ultima III.

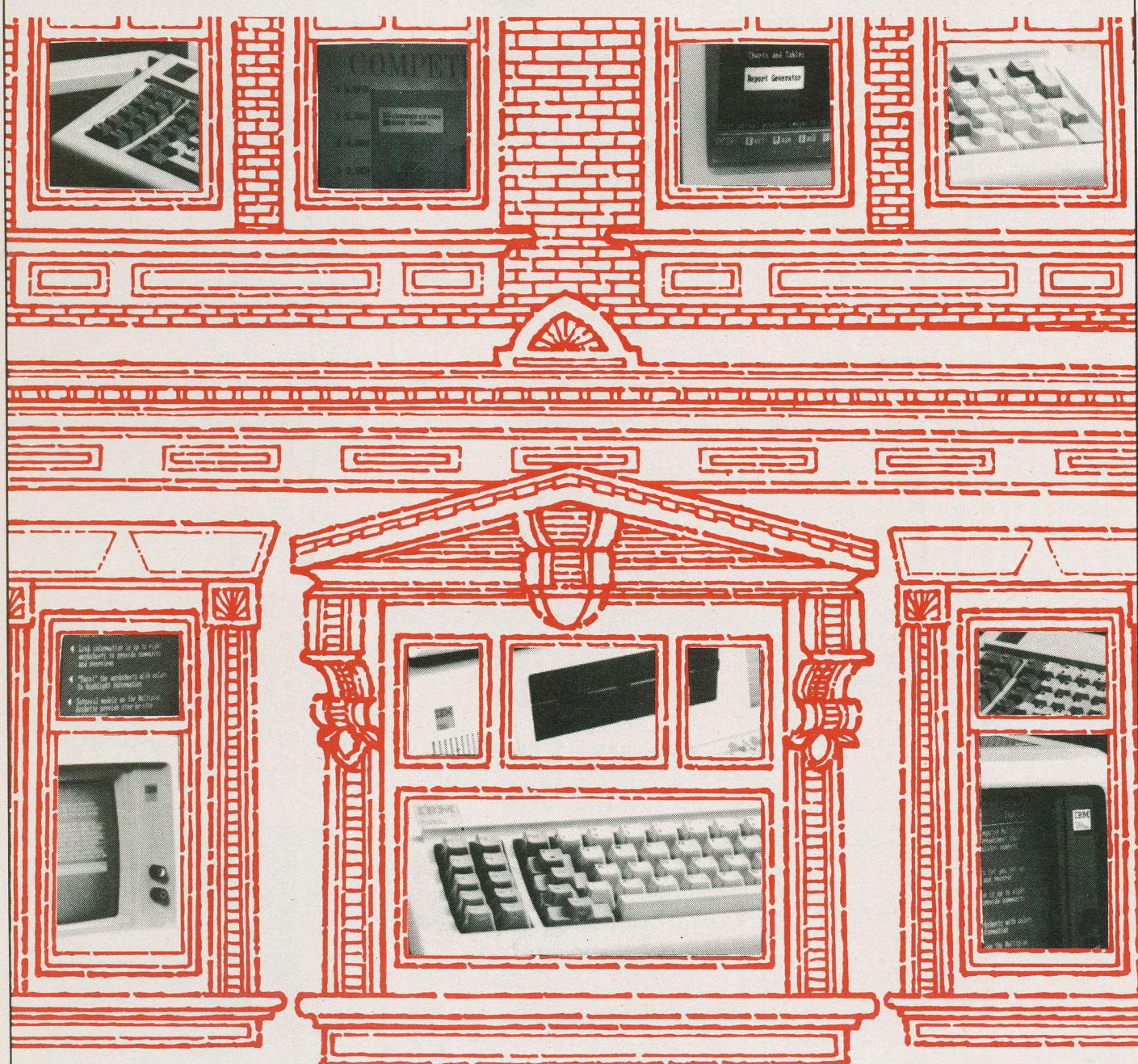
Word Processing Reviews

Looking for writing packages? SN! looks at Leading Edge and Powertext.



For subscriptions call 423-3262
For advertising call 423-3263

Two Shots at Concurrency for the PC



Given enough memory and the right software you can have your PC run more than one program at once, flipping between them as you feel like it. There are a number ways of going about it... here's a peek at two of them.

by Steve Rimmer

Not all that long ago it was moderately difficult to get a computer to perform one task concurrently with the operation of its warranty. Knowing when to blow itself into oblivion, wiping out all the data on its disk and any other disks lying in close proximity to it took most of the processing overhead of those machines.

Times have, of course, changed. The newer sixteen bit systems have heaps more power and can handle three or four tasks all at the same time... wiping out four, rather than one, applications when the whole affair degenerates into a puddle of fuming slag. The potentials of this sort of technology are really staggering. One could crash a whole accounts department with a single machine.

The potential for crashing concurrent systems is only exceeded by the potential for actually doing something productive with them. In fact... assuming that you don't pop for one of those PC compatible systems which offer you sixteen bits for a dollar a bit... one can all but ignore the destructive potential of one of these things and really get into the bells and whistles.

The phrase "concurrent operation" refers to the ability of the computer to run two or more programs at the same time. In this feature we're going to check out what one can really expect from some of the more commonly found concurrent operating systems... or portions thereof. In fact, we'll be looking at two in particular... Concurrent PC DOS and DoubleDOS.

Place your right finger on the *Alt* key...

Memories Are Made Of...

To begin with, one can run just about any computer as a multi-tasking, or concurrent, system. This includes the always popular Commodore 64. The principle is fairly simple.

If you sit down and start typing at a system the computer has to hang around and kill time between each keystroke. Even if you type like the wind almost all of the system's ability is going to be tied up in waiting, because computers are just a world faster than humans. It's okay... we have other attributes.

It's quite practical to have the system running a second program while the first has it waiting for input. In fact, with a sufficiently sophisticated operating system one can have each of two programs running in the idling time... the period between human inputs... of the other.

Of course, we still only have one screen and one keyboard... what the suits call the *console*. The suits dream of being astronauts, you know. As such, we'll designate one program as being in the

foreground and the other one as being in the background. The foreground one shows up on the console, while the background one is invisible, although it's still running. If, for example, it had to access the disk drive we'd see the access light come on.

The great power of an arrangement like this is in being able to swap between these programs... or *tasks* as they are properly called. Hitting some predetermined key or sequence of keys will make the invisible background task show up on the console and relegate the previous foreground task to the background.

For example, one could place one's spreadsheet in the background and one's word processor in the foreground. Thereafter, one could write a document while being able to refer to the spreadsheet or, perhaps, write letters during long recalculations of the sheet.

Now, I said that you could handle multitasking on almost any computer... in a theoretical sense this is true. In a practical one, however, it takes a really massive computer to be able to do it. What we really have happening here are two complete computers sharing the same hardware. Among other things, this entails having enough memory to run the two aforementioned complete computers.

Applications for the PC being traditionally a bit memory hungry, most multitasking operating systems will laugh uproariously at anything less than a quarter megabyte of RAM... and would really like to see five hundred and twelve K. You should bear in mind that, aside from requiring enough memory to run two programs, the system code of a multiuser system is much larger than that of a single user computer, and its housekeeping and scratch memory requirements are immense by comparison.

In fact, concurrent operating systems don't usually handle the decision of their time between tasks by just waiting on the keyboard input. The example of a spread-

sheet recalculating in the background would lock up such a system until it was finished, as it wouldn't look at the keyboard at all.

What actually happens is the maintenance of what are called *time slices*. This is very easy to understand under Unix like systems, like QNX. There's a look at QNX in the September 1984 edition of Software Now! and we'll be having an updated peer shortly.

A time slice is a fraction of a second. At the commencement of each time slice the processor looks at the top of a *priority stack*. Each task is assigned a number on this stack. In the case of the word processor and the spreadsheet, we might assign the word processor a priority of one and the sheet a priority of two, because it's in the background. After all, it will be less inconvenient to have the spreadsheet wait a while to do its calculations than it would be to have the word processor come to a grinding halt every so often.

There is a third task on the heap, which has a priority of fifteen. This is called the *idle administrator* under QNX. Its job is to wait.

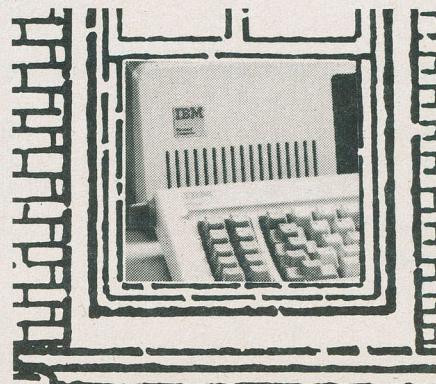
At the beginning of a time slice, then, the operating system looks at the highest priority task. If it requires attention the processor does whatever the task wants and goes to look at the second one. If it's calling for help the processor will handle its requests and then move on to the next task down the line. Assuming there's anything left of the time slice, it will eventually get down to the idle administrator, where it will wait until the slice is over and the next one begins.

This may seem like it wastes a lot of processor time... it doesn't. If any of the tasks can occupy the processor for the whole time slice, they are allowed to. However, the higher priority tasks get dibs on it first. If the word processor, for example, could completely tie up the system, the spreadsheet would never get touched in this model. In practice this never happens.

CP/M Again

Perhaps the most approachable of the two concurrent things we're going to check out is Concurrent PC-DOS, by Digital Research. Digital Research is the creator of old faithful CP/M, as well as CP/M 86, the operating system for the PC you've probably never heard of. Bear in mind that regular old PC-DOS, or MS-DOS, is done by Microsoft.

Concurrent PC-DOS is something of a masterpiece of code... not without its slavering trolls of madness here and there, but pretty slick nonetheless. If you boot up under Concurrent PC-DOS you can



Two Shots at Concurrency for the PC

thereafter work with programs and files on Concurrent disks, MS-DOS disks or CP/M 86 disks. Sporting, what...

The Concurrent operating system is also rife with menus. You can actually banish the menus entirely, once you get used to the commands, but they're pretty handy to begin with. The menus handle everything from installing the system to running programs and manipulating files.

In fairness to the gnomes of Digital Research, who obviously didn't whip this one off overnight, we're not going to have a running tour of Concurrent in this article. The manual that comes with it takes a medium sized phone book to do it, and there's probably still more to say. However, we will look at how this whole party works when you want to make it schizophrenic.

Concurrent PC-DOS runs in at least two hundred and fifty-six K of RAM. After it gets through booting it sets up four windows. Windows are a bit of a head bender, I know, because everyone takes them to mean something slightly different.

In fact, a window under Concurrent is just a screen. Under normal old DOS or CP/M you get one window. Concurrent gives you four. At any one time one of these windows can be showing, with the other three invisible.

Actually, this last bit is only partially true. You can have more than one showing. We'll get to that.

At pretty much any time you want to you can select any window by hitting the control key and one, two, three or four on the numeric keypad. The number of the current window is displayed on the status line at the bottom of the page. Optionally, one can create a batch file to change the display colour of each of the windows at startup, which makes it immediately apparent which window you're in.

Each window is like a separate computer running MS-DOS... or, at least, the peculiar hybrid of MS-DOS and CP/M that this operating system turns out to be. In fact, the commands from both will work. As such, one could select window one, run

BASIC, hop over to window two and run WordStar, blast into window three and run a telecommunications terminal and so forth. You could be downloading software in window three and having WordStar print a document in two while writing a program in one.

Seeing what's happening in any window is easy... one would just hit control and the appropriate number to swap the window in question into the foreground. Under normal circumstances, leaving a window in the background doesn't affect what's going on in it. WordStar would keep plugging away even if you decided to ignore it.

You can, in fact, specifically instruct the computer to suspend the action in any window if you don't want to tend to it. You can also tell it to kill a task in a particular window. Killing a task doesn't erase it from the disk or anything quite so dramatic. It just stops the program and returns that window to the DOS prompt.

Concurrent allows for split windows as well. You could, for example, set up a pro-

TYCOR® THE POWERful SOLUTION

Over 98% of all micro-processor based equipment problems are caused by voltage spikes, surges, oscillatory transients and common mode "noise" superimposed on AC power lines.

Tycor® In-Line (Series) AC Power Line Filters effectively protect equipment against . . .

- 1) MEMORY LOSS
COMPONENT DAMAGE
SYSTEM FAILURE
LIGHTNING DAMAGE

- 2) PROGRAM ERRORS
READ/WRITE ERRORS
COSTLY DOWNTIME
MEMORY LOSS
RE-BOOTS

Actual field evaluations by national companies show an 81%* decrease in service calls.

National Outlets (All Locations)

Andor 800-387-2024
Canlab
ComputerLand
Future Electronics
Olivetti Canada

Sweda
TRW East 800-268-3316
West 800-268-3236
Wang 800-268-7830
Wesco
Xerox

Regional Outlets:

Calgary - Powerco
Montreal - Franklin Electrical
Ottawa - Finlay Moylan & Associates
Toronto - Scarsdale
- Intl. Computer Xchange
Vancouver- Power Protection Systems Group

Manufactured by TYCOR®, Calgary, Alberta

* user figures based on — 200 sites over eight months and 100 sites over twelve months.

gram which would display its status in the upper right hand corner of the screen. You can use the Concurrent window manager to open a hole in the foreground window that looks onto the window with the program you want to keep an eye on. You can actually split up the screen among all four windows if you want to, although few applications will be of much use if you do.

Concurrent PC-DOS will run MS-DOS and CP/M 86 applications... or you can use the ones that come with it. Some of these are better than others. DRTALK for example, the telecommunications software which comes with the package, is actually PC Talk, a public domain bit of "freeware" with the name changed. It's worth about what it costs... if you get it for free.

There are a few limitations in using Concurrent, but none of them are particularly heavy. Like most concurrent operating systems, you'll have to tell the system how it is allowed to subdivide its memory. In fact, it has to be told how much space each window is allowed to allocate for COM files and EXE files. It's not at all difficult to run out of RAM with three or four windows going at once.

Most of the software that one is likely to want to run under PC-DOS is fairly happy with it. Among the hassles are things like running two or more copies of BASIC. It bars on this very notion, perhaps under the principle that an operating system as sophisticated as itself shouldn't really even have to put up with one copy.

This also applies to running business applications which use BASIC.

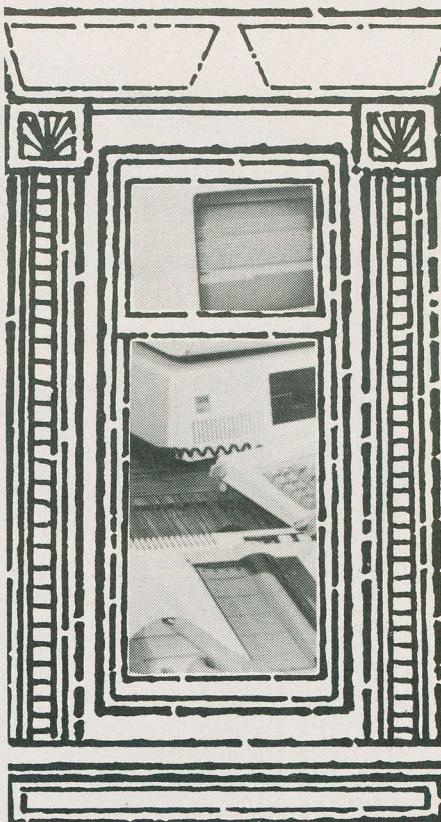
While it's not cheap by any means, Concurrent is probably the most practical solution to using the PC concurrently for most straight up tasks. It's reasonably compatible with the software it will be used for, supported by one of the really venerable software producers and nicely documented. Furthermore, a lot of thought has gone into it, and its human engineering is superb.

We'll have a more complete look at what Concurrent PC-DOS is up to in a later edition of Computing Now!

Twins

If you aren't up for acquiring a whole new DOS... or figure that four windows are more than you'll really ever need... you might want to consider DoubleDOS by SoftLogic Solutions. It's a bit like Concurrent PC-DOS, except that rather than replacing MS-DOS it just adds a degree of concurrency to it.

DoubleDOS is one of those really tricky little bits of code which does something



unexpected. Once it is in place with its hooks in DOS it splits the system RAM into two chunks and allows you to run two individual programs... one in each chunk.

The system overhead which DoubleDOS sucks up for itself is actually reasonably small in comparison with other concurrent operating systems. A system with two hundred and fifty-six K of RAM winds up with two one hundred and eleven K blocks to work with. These are large enough to run BASIC, WordStar and most other medium sized applications.

Obviously, if one has more system RAM DoubleDOS will make the chunks larger.

Although there are a number of ways to invoke DoubleDOS, the easiest is to simply run it after the system has booted. Well, it's more or less simple... there's a catch we'll get into in a moment. This brings up a menu which allows one to select the size of each of the two program memory chunks... if you just hit return it splits the affair neatly in half.

Once DoubleDOS is in place you can get to its main menu by hitting the control alternate delete key combination... which is normally reserved for rebooting the system. Obviously, DoubleDOS plays with quite a few of the system interrupts, this one included. Rather than jumping for the grand

retrash, this brings up one of two menus, depending upon whether or not one has programs running on the system.

The usual reboot is, in fact, one of the options of both menus.

One can get to the DoubleDOS menu at any time, whether from the DOS prompt or while lodged firmly in a program. The menu allows one to kill or suspend a task in either window, as well as to switch the foreground and background tasks around. The menu starts out on the first option, so, in fact, one can simply hit control alternate delete and then return to swap windows.

If you've been into using a PC for a while your fingers will recoil from the thought of hitting control alternate delete halfway through an edit... and well they should.

DoubleDOS is pretty decent little sloth, but it has some limitations which one should be aware of. Some are a bit annoying... some are downright weird... and one is barbaric, pointless and, more to the point, deliberate. Many applications won't be affected by any of them... but some will be grabbed by the feet and flung into the gorges of screaming death without warning.

The first thing that potential users of DoubleDOS should bear in mind is that unlike as in the case of Concurrent PC-DOS, the windows of DoubleDOS are only somewhat isolated from each other. They can interact, and, when they take it upon themselves to do so the results are always colourful. For example, having something textual happening in the visible window while BASIC is using the high resolution graphics in the wings is profoundly uncool. Strange coloured characters will turn up on your screen... unless, of course you have a monochrome monitor.

This latter variation doesn't in any way obviate the problem. It just makes it less kaleidoscopic.

DoubleDOS is at its best running straight up business applications... and gets a bit flustered if it's given unusual software to chew on.

One of the really promising potentials of any concurrent operating system is to have it handle telecommunications as a background task. Most of the system use involved in, say downloading a file, is tied up in waiting for the next character to crawl through the modem port. In turn, if one is getting one's head into modems, one spends an awful lot of time waiting.

If you've got a handle on concurrency, on the other hand, you should be able to do something during those long waits while you're downloading text or doing something equally as cool. This is fairly

Two Shots at Concurrency for the PC

reasonable under some concurrent things... it may not happen for you under DoubleDOS.

DoubleDOS behaves fairly unpredictably with telecommunications programs. Simple ones which access the PC's ports directly tend to lose characters... quite a few characters... if the other task running under DoubleDOS decide to hog the party. Interrupt driven terminals occasionally hang the thing completely.

The second, and perhaps more disagreeable restriction of DoubleDOS is that it slows down the screen access and keyboard input of both programs running under it. The exact magnitude of this reduction in speed varies with the system use. Two really hungry programs... such as BASIC and WordStar... will very easily take it down to about the rate of a twelve hundred baud modem.

In all fairness, WordStar isn't really useable under these sorts of restrictions... I don't think that any program that does a lot of screen updates would be if it's to be used with another processor intensive application happening in the other window.

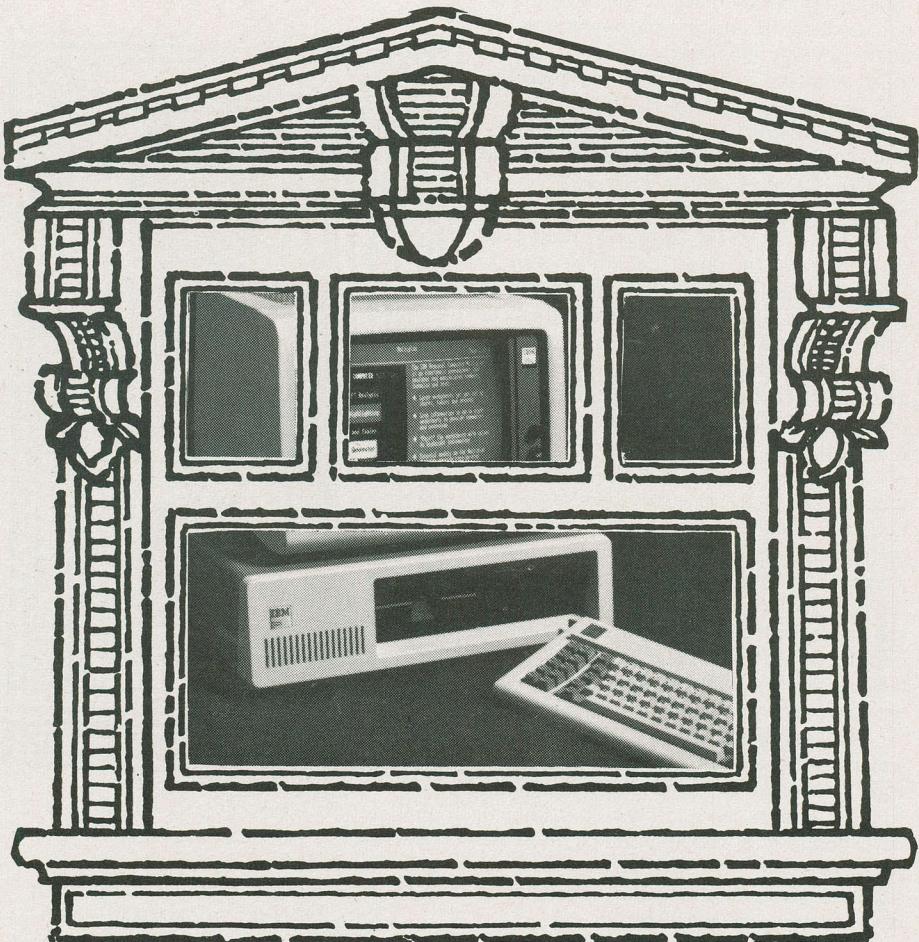
The next peculiarity of the system is that if you try to load a program into a memory section which is larger than the available RAM in that section the whole works comes to a crashing halt. You can occasionally kill such a task and get control of the window back... but not always. On a few shots at this my copy of DoubleDOS hung the whole computer, trashing the other window as well.

There is, in fact, some software which will hang the machine even if it has enough memory to run. The more obscure stuff really gets into this. The DoubleDOS manual doesn't offer any suggestions concerning what will and will not run with the package.

One thing you can't do is to run BASIC or BASIC based applications in both windows. It's also worth noting that with BASIC in even one window the system clock shifts into overdrive and starts counting like the world is about to end.

All of these hassles, however, are of questionable import if you're planning to use DoubleDOS with the right sort of applications. Ideally, you should endeavour to try your software out with it before you buy DoubleDOS, as it comes complete with a license agreement under which all your options turn into a pumpkin as soon as you open the envelope the disk comes in.

Programs which basically handle data, and don't do a lot of screen manipulations or graphics will probably run quite acceptably under DoubleDOS... so long as they don't do anything that upsets it.



The real technological gorch in DoubleDOS, however, is in that the master disk is copy protected. You can't back it up. As such, if you get anything really good going with it and the master disk decides to pop for the old disk read error message you are well and truly fried.

Actually, this is even more of a nuisance under DoubleDOS than it is under most other copy protected packages, in that you can't practically use DoubleDOS on a hard drive either... unless you keep the master floppy on line too.

I can relate that software manufacturers suspect that there are pirates out there... I do object to their assuming that I'm one of them.

While a bit funky and of restricted usefulness in some areas, DoubleDOS is an interesting approach to concurrency. However, both its advertising and its manual should be a lot more specific regarding what it can and cannot manage.

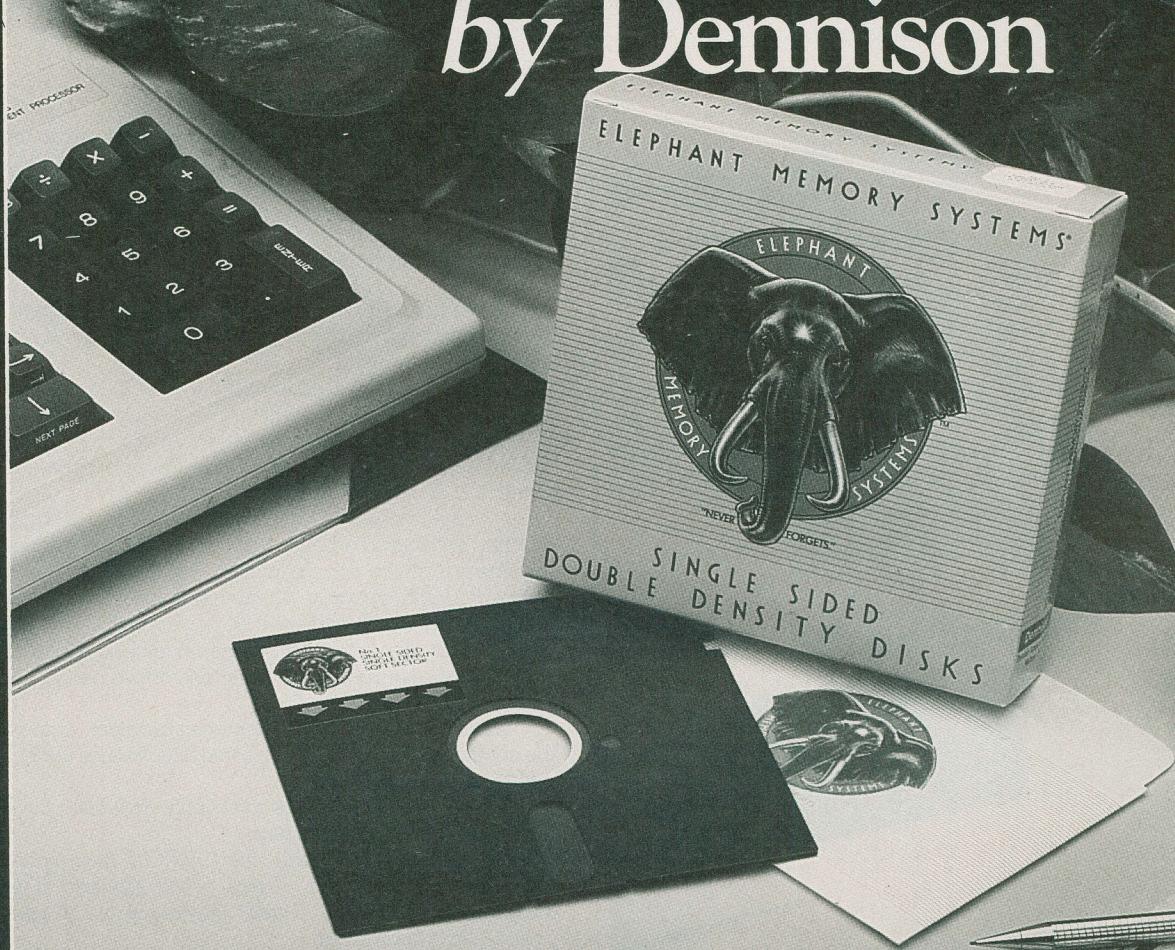
Reboot

It's actually amazing how much of one's time one spends waiting for the wait flag to vanish or the prompt to re-appear. Having two or more interactive tasks on line at once can do astounding things for one's general productivity and general head space.

Both of these packages can do really good things for your applications software. In the case of the former, one can also look to the other side of concurrency, having multiple users on a single system. We'll have a look at this, too, in a later edition of Computing Now! **CN**

ELEPHANT MEMORY SYSTEMS®

Elephant Disks . . . by Dennison



A full line of top-quality floppies, in virtually every 5 1/4" and 8" model,
for compatibility with virtually every computer on the market.

Guaranteed to meet or exceed every industry standard,
certified 100% error-free and problem-free, and to maintain its quality
for at least 12 million passes
(or over a lifetime of heavy-duty use).

Dennison

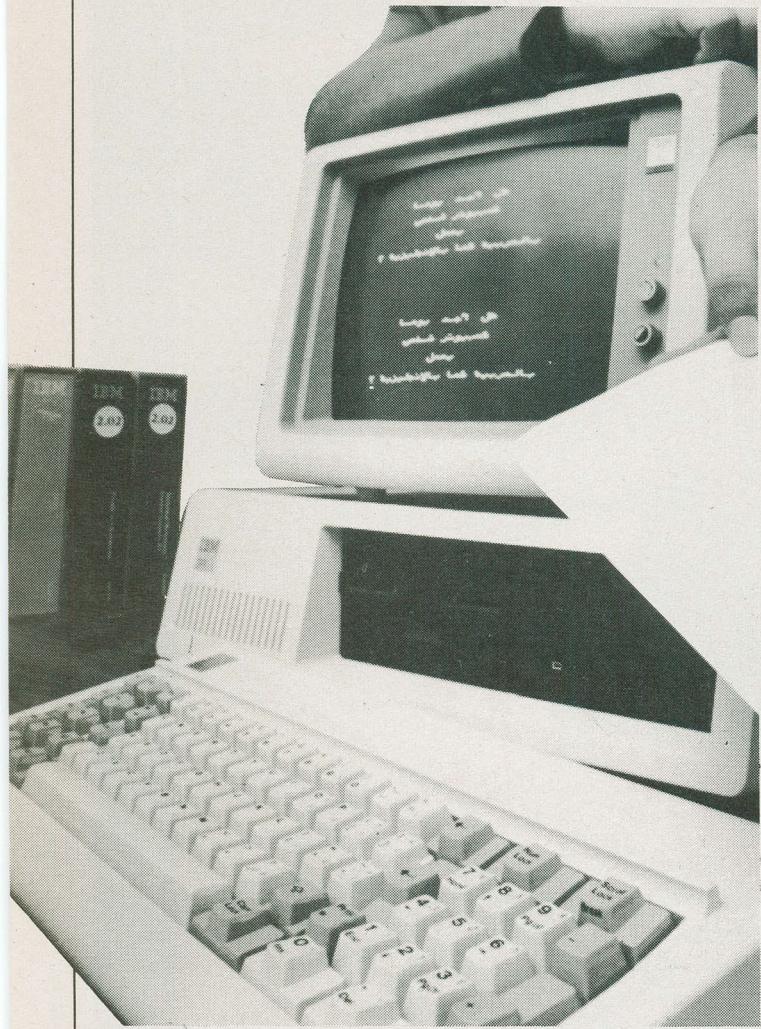
Dennison Manufacturing Canada Inc.
Les Fabrications Dennison du Canada Inc.
200 Base Line Road East, Bowmanville, Ontario L1C 1A2
Telephone (416) 623-6311 Telex 06-981392

1-800-387-5037
B.C. 112-800-387-5037
TORONTO (416) 495-9353

Shades for the PC

Here's a look at a simple utility which allows one complete and utter domination over the colour of every wretched, pleading peasant of a character on the whole vast expanse of the IBM PC's screen. The rush of power certainly makes one feel feudal, doesn't it...

by Steve Rimmer



Mastering the instruction set of the 8088 is only part of the really bizarre odyssey of learning how to program the IBM PC. You also have to handle the DOS calls and figure out how to interact with the operating system in general. Some of this stuff can be highly weird. The guys who wrote MS-DOS went on to work as guest attractions in John Carpenter movies.

One of the most mind warping groups of instructions in the 8088 is the string manipulation set. This thing... ahem, when properly tickled... will do all sorts of things that programmers for other chips had to write fairly complex routines to get together. Instead, all you have to do is to set up a handful of parameters and let the chip loose on them.

Most of the time they seem to want to throw "parity check" errors, I know.

This month we're going to have a look at one of the string manipulation instructions... the string compare... which, when come upon in the quiet, pastoral surroundings of the accompanying screen colour attribute utility, is a moderately useful little wombat.

Gentlemen, start your assemblers...

Colour With a "U"

The code that accompanies this feature allows one to decide what colour one's screen will be. This presumes that one has a colour monitor atop one's PC.

COLOUR is fairly easy to use. If you type

A>COLOUR RED

the screen will clear and the prompt will re-appear in red on a black background. If you give COLOUR a bad option, or none at all, it prints a menu.

This arrangement allows COLOUR.COM to be used in a batch file. If you always want your system to come up with, say, yellow type... it makes the screen look more or less like that of an amber monitor... you could include the appropriate COLOUR command in an AUTOEXEC.BAT file.

In order to get COLOUR together we have to be able to do a number of things. To begin with, we'll need to be able to get an argument from the command line. We saw how to do this in the February 1985 edition of Computing Now!, but this incarnation of the problem is a bit different because we will be comparing strings of alpha characters, rather than numbers. Alpha characters, as you may have noted, can be in one of two cases, which somewhat confuses the issue.

The next... and fairly fundamental problem.. is in comparing the command line argument to some fixed strings to decide which option has been selected.

Finally, the program has to actually do what it has been told to do... easily the simplest part.

Checking out the code, the OPTION subroutine gets the command line argument. There are a number of interesting things happening here... well, they're certainly interesting if you're a microprocessor.

The fairly unusual line that reads

MOV BUFFER[DI],AL

may be a bit confusing for a start, as it's of a form which isn't used as often as most of the other permutations of 8088 code. It also uses the DI register, which most people leave alone unless it barks.

This line could also be written

MOV [BUFFER + DI],AL

which is a bit more descriptive.

The DI register is just another register, like AX, as far as this bit of code is concerned. What makes it special is its ability to index a pointer, or serve as an offset. This line is telling the 8088 to move the contents of AL into the location in memory pointed to by the value BUFFER added to the contents of DI.

This is a very convenient way to handle strings, which are generally manipulated in this form.

The other catch in this subroutine is the call to UCASE. The UCASE procedure takes whatever it finds in AL and converts it to

ADVANCE-INTERFACE ELECTRONIC INC.

8000 SERIES LSI

80C35	\$ 9.00
8035L	\$ 7.80
80C39	\$ 9.80
8039	\$ 8.20
8085A	\$ 5.90
8085A-2	\$ 14.60
8086	\$ 21.50
C8087-2	\$449.00
C8087-3	\$225.00
8088	\$ 14.50
8089A	\$155.00
8155	\$ 9.60
8156	\$ 9.60
8202A	\$ 49.50
8212	\$ 3.10
8214	\$ 4.40
8216	\$ 2.90
8226	\$ 7.50
8228	\$ 8.50
8237A-5	\$ 14.50
8243	\$ 8.50
82C43	\$ 8.80
8250AN	\$ 17.00
8250BN	\$ 17.00
8251A	\$ 6.60
8253C-5	\$ 7.50
8255A-5	\$ 6.70
8257C-5	\$ 8.30
8259A-5	\$ 6.40
8279C-5	\$ 8.50
8282	\$ 8.80
8283	\$ 6.50
8284A	\$ 7.50
8286	\$ 7.90
8287	\$ 8.00
8288	\$ 15.50
8289	\$ 34.00
8741A	\$ 32.00
8748	\$ 33.00
8749	\$ 36.00
8751A	\$265.00
8755A	\$ 85.00

6500 SERIES LSI

6502A	\$5.75
6520A	\$6.00
6522A	\$6.20
6532	\$9.80

Z80A SERIES LSI

CPU	\$ 4.50
CTC	\$ 5.20
DMA	\$15.00
DART	\$10.50
PIO	\$ 5.20
SIO/O	\$15.00
SIO/1	\$15.00
SIO/2	\$15.00
B-CPU	\$10.50
2651A	\$23.00
2661A	\$23.00

UARTS

AY3-1015D	\$ 7.00
AY5-1013A	\$ 5.90
IM6402IPL	\$19.00

REAL-TIME CLOCK CHIPS

MSM5832RS	\$13.00
MM58167A	\$19.50
MM58174A	\$19.50

FSK MODEM CHIPS

TMS99532	\$19.00
----------	---------

8088 KIT

INCLUDED: 8255A-5 8284A
8088 8259A-5 8288
8237A-5
8253-5

\$65.00/set

EPROM

2816A \$65.00
INTEL/SEEQ

RAMS

2016AP-10	\$ 7.00
2114AP-12	\$ 1.90
4116-15	\$ 1.15
4416/81416	\$ 8.50
MK4801A	\$17.50
5514AP-12	\$ 4.50
6116LP-15	\$ 7.00
6264LP-15	\$38.00

64K RAMCHIPS SPECIAL!!

120ns \$48.00/set of 9
150ns TOS/NEC/MIT \$34.00/kit of 9 pcs.
For quantity more than 1,000, please call!!!

256K RAMCHIPS SPECIAL

256K D-RAM TOS, TMM41256C-15

\$22.00/ per piece or **\$190.00/** set of 9 pcs.

Any quantity

EPROMS

TMS2716(3V) 450ns	\$14.00
2716-450ns	\$ 4.50
2716-300ns	\$ 8.80
27C16-450ns	\$24.00
2732-450ns	\$ 6.30
2732A-250ns	\$ 6.90
2532-450ns	\$ 8.50
2764-250ns	\$ 8.90
27C64-200ns	\$24.00
27128-450ns	\$18.50
27128-250ns	\$19.50
27256-300ns	\$88.00

IC PROGRAMMING SERVICE

2716 — 27512
27C16 — 27C256
2816A — 48016
8741A — 8755A

Call !!!

MISC ICS

ULN2001A	\$1.55	ULN2074	\$4.80
ULN2002A	\$1.55	ULN2075	\$4.80
ULN2003A	\$1.55	26LS29	\$3.30
ULN2004A	\$1.55	26LS30	\$3.30
ULN2005A	\$2.20	26LS31	\$3.30
ULN2064	\$4.80	26LS32	\$3.30
ULN2065	\$6.70	26LS33	\$3.30
ULN2066	\$4.80	ULN2803A	\$3.15
ULN2067	\$6.70	MC3486P	\$2.60
ULN2068	\$5.75	MC3487P	\$2.60
ULN2069	\$6.70		

FLOPPY DISK CONTROLLERS

uPD765A/P8272A	\$ 14.00
P8271 INTEL	\$144.00

NEC LSIS

uPD720IC	\$22.00
uPD7210C	\$26.00
uPD7220D	\$46.00

WESTERN DIGITAL LSIS

FD1771	\$22.00
FD1791	\$42.00
FD1793	\$42.00
FD1795	\$47.00
FD1797	\$58.00
FD2791	\$52.00
FD2793	\$52.00
FD2795	\$57.00
FD2797	\$59.00
WD1691	\$23.00
WD2143	\$21.00
WD9216-00	\$18.00

D-CONNECTORS

9P	\$2.50
9S	\$2.80
15P	\$2.80
15S	\$3.20
25P	\$3.30
25S	\$3.60
37P	\$3.80
37S	\$4.20
50P	\$4.80
50S	\$5.50

IBM PC/XT COMPATIBLE FLOPPY DISK DRIVE

Panasonic/Shugart	\$175.00 — 1-9 pcs.
JA551-3 (= SA455-3)	\$148.00 — 10-49 pcs.
DS/DD, 1/2 Ht.	\$142.00 — 50 pcs. up

PC/XT KEYBOARD

100% Compatible **\$129.00**

BY-PASS CAP BY AVX

0.1 uf 50V **\$1.20** for 10 pcs.

HIGH QUALITY FLOPPY DISK

2-side/2-density by 3M
\$33.00/box of 10 pcs.
Card boxed (5 boxes or up- **\$30.00/**box)

1-side/2-density by VERBATIM
DATALIFE (5 boxes or up- **\$23.00/**box)
\$26.00/box of 10 with plastic cases

CRT CONTROLLERS

6545-1	\$14.90
6845.	\$ 9.90
68B45	\$14.90

SWITCHING REGULATOR ICs

TL430	\$ 2.60
TL494	\$ 2.30
TL497A	\$ 2.25

INTERNAL CLOCK

6802P	\$ 6.95
6809P	\$15.90

PARALLEL INTERFACE CONNECTORS

57F-30360 (Flat Cable)	\$ 6.50 plug
57-30360 (Solder Pin)	\$ 5.50 plug
57-40360 (Solder Pin)	\$ 5.20 socket
57-30240 (Solder Pin)	\$ 6.20 plug
57-40240 (Solder Pin)	\$ 5.00 socket
57-30500 (Solder Pin)	\$10.50 plug
57-40500 (Solder Pin)	\$11.50 socket

MON-FRI	9:00 to 6:00
SAT	10:00 to 6:00

*All prices and availabilities are subject to change without notice

* * * Call us for quantity pricing & delivery information * * *

Mail Orders add \$5.00 for shipping and handling. Ontario residents add 7% P.S.T. VISA, Mastercard, Money Order and Certified Cheque accepted.

ADVANCE-INTERFACE ELECTRONIC INC.

232A Queen St. West, 2nd floor, Suite 1, Toronto, Ontario M5V 1Z6

TELEX = 06-218660

FAX = 416-495-1214 (G2/G3)

TEL = 416-591-8433

Shades for the PC

an upper case alphabetic letter if it happens to be a lower case one. This is necessary because of a quirk of MS-DOS which doesn't convert the command line argument to all upper case characters. Thus,

A>COLOUR RED

would be a valid argument to COLOUR.COM, while

A>COLOUR red

would not.

The command line argument is always terminated by a carriage return. As such, we can move each byte to the buffer until one of them turns up as ODH, at which point the routine has done its stuff.

The TABLE entries, which is what we'll be comparing the argument to in a second, consist of eight byte strings. Each string is a potential argument padded out with spaces. By defining the buffer as

DB 8 DUP(')

we can assure that when it has been loaded with the command line argument it will look like a TABLE entry.

The next important function of the program is in the GETOPT procedure. It assumes that the command line argument is alive and well and living in BUFFER. It compares it to each of the entries in TABLE.

This code uses the string comparison instruction, CMPSB. There is a similar string movement instruction which we might well have used in the OPTION procedure. However, as useful as the string manipulation instructions are, it's often the case that they don't provide any real advantage in the resultant size or speed of the code they generate... and they're always strange to debug.

In moving the command line argument we had to move a string of undefined length, which would have meant two string operations...one to scan for the carriage return, to determine its length, and one to actually do the move. In this case, however, the string compare is fairly advantageous to use. We can set all of its parameters fairly easily.

The form of the string compare instruction is fairly easy. The two strings to be compared are pointed to by the SI and DI registers. The length of the strings is poured into CX and the instruction itself is thrown. It goes

REPE CMPSB

which means to compare the strings one byte at a time and to continue to do so until the CX register hits zero. Having done this, the E flag will be set if the strings matched. A JE will thus branch if both strings were the same.

With the table of strings neatly padded out to a fixed length it's fairly easy to scan through them, comparing the buffer contents to each in turn.

Go For It

Having finally ascertained which colour the command line argument called for, actually getting the colour onto the screen is pretty straight up. Not surprisingly, there is an interrupt to do it.

The DOS calls provided for screen manipulations allow for, among other things, the clearing of screen windows. In this case a window is just a rectangle on the tube. You can select any four co-ordinates as the corners of the rectangle and, having done so, scroll the contents of it up or down by as many lines as you feel like.

```
COMMENT /  
COLOUR  
Copyright 1985 (c) Steve Rimmer  
Changes the foreground colour of the IBM display  
in accordance with the command line argument  
Also whitens, brightens and sharpens the teeth of  
your children.  
  
/  
VERS EQU 1  
SUBVERS EQU 8  
  
TAB EQU 9 ;TAB CHARACTER  
LF EQU 10 ;LINE FEED  
CR EQU 13 ;CARRIAGE RETURN  
COMTAIL EQU 0082H ;COMMAND TAIL  
  
CODEX SEGMENT  
  
MAIN PROC FAR  
ASSUME CS:CODEX  
ORG 0100H  
  
START: JMP START1  
  
;Be careful with this table. The literals must be 8 bytes  
;long. Make sure you don't use tabs instead of spaces.  
  
TABLE: DB 'BLACK ',0  
DB 'BLUE ',1  
DB 'GREEN ',2  
DB 'CYAN ',3  
DB 'RED ',4  
DB 'MAGENTA ',5  
DB 'BROWN ',6  
DB 'LGREY ',7  
DB 'DGREY ',8  
DB 'LBLUE ',9  
DB 'LGREEN ',10  
DB 'LCYAN ',11  
DB 'LRED ',12  
DB 'LMAGENTA ',13  
DB 'YELLOW ',14  
DB 'WHITE ',15  
  
BUFFER DB 8 DUP(20H)  
  
START1: CALL OPTION ;GET COMMAND ARGUMENT  
CMP AH,20H ;IF ERROR  
JE BADOPT ;...SHOW HELP MESSAGE  
CALL GETOPT ;COMPARE COMMAND ARGUMENT  
CMP AH,20H ;WITH TABLE... IF ERROR  
JE BADOPT ;...SHOW HELP MESSAGE  
  
PUSH AX ;COLOUR CODE IS IN AH  
  
MOV AH,0 ;SET SCREEN MODE  
MOV AL,3  
INT 10H  
  
POP AX ;THIS WHOLE MESS  
MOV BH,AH ;SCROLLS THE SCREEN  
MOV AH,6 ;TWENTY FOUR LINES  
MOV AL,0 ;AND PUTS THE CHOSEN  
MOV CX,0 ;ATTRIBUTE ON THE  
MOV DH,24 ;NEW LINES  
MOV DL,80  
  
INT 10H  
  
QUIT: INT 20H ;BACK TO DOS  
  
BADOPT: CALL ILPRNT  
DB CR,LF,TAB,TAB,'Colour Version ',VERS+'0','.',SUBVERS+'0','.  
DB CR,LF,TAB,TAB,'Copyright 1985 (c) Steve Rimmer'  
DB CR,LF  
DB CR,LF,TAB,TAB,'The available colours are:'  
DB CR,LF,TAB,TAB,  
DB CR,LF  
DB CR,LF,'BLACK ',TAB,'BLUE ',TAB,'GREEN '  
DB TAB,'CYAN ',TAB,'RED '  
DB CR,LF,'MAGENTA ',TAB,'BROWN ',TAB,'LGREY '  
DB TAB,'DGREY ',TAB,'LBLUE '  
DB CR,LF,'LGREEN ',TAB,'LCYAN ',TAB,'LRED '  
DB TAB,'LMAGENTA ',TAB,'YELLOW '  
DB CR,LF,'WHITE '  
DB CR,LF  
DB CR,LF,TAB,TAB,'Typical key blast: A>COLOUR RED'  
DB CR,LF,0  
JMP QUIT  
  
MAIN ENDP
```

Almost Free Software #1

Almost Free Software #1, #2 and #3 are for CP/M and are available in a variety of formats: Apple II + CP/M, 8 inch SSSD*, Access Matrix, Morrow Micro Decision, Superbrain, Xerox/Cromemco*, Epson QX-10VD, Sanyo MBC 1000, Neima Persona, Kaypro II, Osborne Single* and double densities, Televideo, DEC VT-180, Casio FP-1000, Zorba.

*single density formats require two disks. The package cost for these formats is \$22.95.

Modem7. Allows you to communicate with any CP/M based system and download files. Complete details were in Computing Now! November 1983.

PACMAN. You can actually play PAC-MAN without graphics, and it works pretty fast.

FORTH. A complete up-to-date version of FIG FORTH, complete with its own internal DOS.

DUU. The ultimate disk utility allowing you to recover accidentally erased disk files, fix gorchd files, rebuild and modify your system. A real gem.

D. A sorted directory program that tells you how big your files are and how much space is left on the disk.

USQ/SQ. Lets you compress and uncompress files. You can pack about 40% more stuff on a disk with this system.

Finance. A fairly sophisticated financial package written in easily understandable, modifiable Microsoft BASIC.

BADLIM. Ever had to throw out a disk with a single bad sector? This isolates bad sectors into an invisible file, making the rest of the disk useable.

DISK. Allows you to move whole masses of files from disk to disk without having to do every one by hand, you can also view and erase files with little typing.

QUEST. A "Dungeons and Dragons" type game.

STOCKS. This is a complete stock management program in BASIC.

SEE. Also known as TYPE17, will TYPE any file, squeezed or not allowing you to keep documents in compressed form while still being able to read them.

**Order as AFS #1
and specify system**

Almost Free Software #2

BISHOW. The ultimate file typer, BISHOW version 3.1 will type squeezed or unsqueezed files and allow you to type files which are in libraries (see LU, below). However, it also pages in both directions, so if you miss something, you can back up and see it again.

LU. Every CP/M file takes up unnecessary overhead. If you want to store lots of data in a small space, you'll want LU, the library utility. It permits any number of individual files to be stored in one big file and cracked apart again.

RACQUEL. Everyone should have one printer picture in their disk collection.

MORTGAGE. This is a very fancy mortgage amortization program which will produce a variety of amortization tables.

NSBASIC. Large disk BASIC packages, such as MBASIC, are great... and very expensive. This one, however, is free... and every bit as powerful as many commercial programs. It's compatible with North Star BASIC, so you'll have no problem finding a manual for it.

Z80ASM. This is a complete assembler package which uses true Zilog Z80 mnemonics. It has a rich vocabulary of pseudo-ops and will allow you to use the full power of your Z80 based machine... much of which can't be handled by ASM or MAC.

VFILE Easily the ultimate disk utility, VFILE shows you a full screen presentation of what's on your disk and allows you to mass move and delete files using a two-dimensional cursor. It has heaps of features, a built-in help file and works extremely fast.

ROMAN. This is a silly little program which figures out Roman numerals for you. However, silly programs are so much fun...

CATCHUM. If you like the fast pace and incredible realism of Pacman, you'll go quietly insane over Catchum... which plays basically the same game using ASCII characters. Watch little "C"s gobble periods while you try to avoid the deadly "A's"... It's a scream.

**Order as AFS #2
and specify system**

Almost Free Software #3

OIL. This is an interesting simulation of the workings of the oil industry. It can be approached as either a game or a fairly sophisticated model.

CHESS. This program really does play a mean game of chess. It has an on-screen display of the board, a choice of colours and selectable levels of look ahead.

DEBUG. The DDT debugger is good but this offers heaps of facilities that DDT can't and does symbolic debugging... it's almost like being able to step, trace and disassemble through your source listing.

DU87. The older DUU program does have some limitations. This version overcomes them all and adds some valuable capacities. It will adapt itself to any system. You can search, map and dump disk sectors or files. It's invaluable in recovering damaged files, too.

ELIZA. This classic program is a micro computer head shrinker... It runs under MBASIC, and, with very little imagination, you will be able to believe that you are conversing with a real psychiatrist.

LADDER. This is... this program is weird. It's Donkey Kong in ASCII. It's fast, bizarre and good for hours of eye strain.

QUIKEY. Programmable function keys allow you to hit one key to issue a multi-character command. This tiny utility allows you to define as many functions as you want using infrequently used control codes and to change them at any time... even from within another program.

RESOURCE. While a debugger will allow you to disassemble small bits of code easily enough, only a true text based disassembler can take a COM file and make source out of it again. This is one of the best ones available.

Almost Free PC Software #1

For IBM PC's and genuine compatibles. Available in Double-Sided or two Single-Sided Disks.*

PCWRITE. While not quite Wordstar for nothing, this package comes extremely close to equaling the power of commercial word processors costing five or six bills. It has full screen editing, cursor movement with the cursor mover keypad, help screens and all the features of the expensive tools.

SOLFE. This is a small BASIC program that plays baroque music. It's also a fabulous tutorial on how to use BASIC's sound statements.

PC-TALK. A Telecommunications package for the IBM PC which does file transfers in both ASCII dump and MODEM/X-MODEM protocols and comes with... get this... 119424 bytes of documentation.

SD. This sorted directory program produces displays which are a lot more readable than those spewed out by typing DIR.

FORTH. This is a small FORTH in Microsoft BASIC. You can build on the primitives integral with the language.

LIFE. An implementation of the classic ecology game written in 8088 assembler.

MAGDALEN This is another BASIC music program.

CASHACC. This is a fairly sophisticated cash acquisition and limited accounting package written in BASIC. It isn't exactly BPI, but it's a lot less expensive.

DATAFILE. This is a simple data base manager written in... yes, trusty Microsoft BASIC.

UNWS. Wordstar has this unusual propensity for setting the high order bits on some of the characters in the files it creates. Here's a utility to strip the bits and "unWordstar" the text. The assembler source for this one is provided.

HOST2. This is a package including the BASIC source and a DOC file to allow users with Smart-Modems to access their PC's remotely. It's a hacker's delight.

**Order as AFPCS #1
Specify Double-Sided or
2x Single-Sided.***

See page 64 for AFPCS #2
Software Services
Moorshead Publications
25 Overlea Boulevard,
Suite 601,
Toronto, Ontario M4H 1B1
Phone orders using Visa,
Mastercard or American Express:
(416) 423-3262

\$19.95 each

Except for 8" disks and those with two disks which are marked with an asterisk (*) above which are:

\$22.95

Ontario Residents add 7% P.S.T.

All of this software has been obtained from public access sources and is believed to be in the public domain. The prices of the disks defer the cost of reproducing them and mailing them, plus the cost of the medium. The software itself is offered without charge. A few items include messages imbedded in the code asking for voluntary donations on behalf of the authors.

Moorshead Publications warrants that the software is readable and if there are defects in the medium, we will replace it free of charge. While considerable effort has been made to ensure that programs are thoroughly debugged, we are unable to assist in adapting them for your own applications.

Shades for the PC

```

OPTION PROC NEAR
;MOVES COMMAND LINE ARGUMENT TO BUFFER
MOV BX,OFFSET COMTAIL ;POINT AT ARGUMENT
MOV AH,[BX] ;SEE IF IT'S BLANK
CMP AH,20H ;IF SO, RETURN WITH ERROR
JE CMOVE2 ;...SCOOT
SUB DX,DX ;ZERO POINTER INTO BUFFER
CMOVE1: MOV AL,[BX] ;GET BYTE OR ARGUMENT
CMP AL,ODH ;SEE IF IT'S END
JE CMOVE2 ;IF SO, RETURN NO ERROR
CALL UCASE ;CONVERT CASE
MOV DI,DX ;GET POINTER INTO DI
MOV BUFFER[DI],AL ;PUT CHARACTER IN BUFFER
INC BX ;BUMP UP...
INC DX ;...ALL POINTERS
JMP CMOVE1 ;AND LOOP
CMOVE2: RET
OPTION ENDP

UCASE PROC NEAR
;CONVERTS LOWER CASE TO UPPER CASE
CMP AL,'a' ;SEE IF CHR IS
JL NOCASE ;IN THE RANGE OF
CMP AL,'z' ;'a' TO 'z' AND
JC NOCASE ;SUBTRACT OFFSET
SUB AL,'a'-'A' ;IF SO
NOCASE: RET
UCASE ENDP

ILPRT PROC NEAR ;IN LINE PRINT
POP BX
ILPLP: MOV DL,[BX]
CMP DL,0
JE ILPRET
MOV AH,2
PUSH BX
INT 21H
POP BX
INC INC BX
JMP ILPLP
ILPRET: INC BX
PUSH BX
RET
ILPRT ENDP

GETOPT PROC NEAR
MOV BX,OFFSET TABLE ;POINT INTO TABLE
MOV CX,16 ;SIXTEEN ENTRIES IN TABLE
OLLP: PUSH CX ;SAVE LOOP COUNTER
MOV SI,OFFSET BUFFER ;POINT TO BUFFER
MOV DI,BX ;POINT TO TABLE
MOV CX,8 ;GET LENGTH OF ENTRY
REPE CMPSB ;DO COMPARE
JZ GOTOPT ;IF EQUAL, GO DO FETCH
MOV AX,9 ;OTHERWISE, LOOK AT NEXT ENTRY
ADD BX,AX ;
POP CX
LOOP OLLP ;GET POINTER BACK
MOV AH,20H ;LOOP 'TIL DONE
MOV AH,20H ;SHOW BAD OPTION
RET

GOTOPT: POP CX ;CLEAN UP STACK
MOV AX,8 ;POINT TO APPROPRIATE BYTE
ADD BX,AX ;
MOV AH,[BX] ;GET IT IN AH
RET

GETOPT ENDP
CODEX ENDS
END START

```

If you scroll the window by more lines than it has in it you effectively clear it.

Any lines that are scrolled so that the real estate where they used to reside is now a vacant lot can be filled with an attribute, such that whatever next comes to graze in them will come up in the colours defined by that attribute.

If you define the whole screen as a window and scroll it all out of existence you can change the whole screen's attribute. This is what the last part of COLOUR.COM's main procedure does.

The byte which defines the screen's attribute is fairly complex. However, it's a bit easier if it's looked at in binary. The bytes goes

WBBBFFFF

which probably still looks pretty mysterious.

The low order nybble of the byte, the last four bits here, marked with F's, are the foreground colour. Being four bits long this value can range from zero to fifteen. The colours these values produce can be found in TABLE of the source listing.

The three B bits are the background colour bits. This can be one of eight values. The eight colours are the first eight entries in TABLE. To get yellow letters on a blue background, for example, the attribute byte would be figured as fifteen, for yellow, plus sixteen times one. The one is the blue attribute and multiplying it by sixteen rotates it up four bits into the background colour position.

The final bit, which I've called W because both B, for blinking, and F, for flashing, are already spoken for, decides whether the character printed with this attribute will be flashing. If the bit is zero, which is normally the case, the character is steady. If this bit is set the character blinks.

The attributes which accompany the strings in TABLE are simple because they set the background colour to zero... black... and the blinking bit off. You could, for example, make the background blue by adding sixteen times one to each of them.

Divine Attribution

The colour program, aside from being convenient and reasonably useful, is a good example of a number of programming techniques for the 8088. You can probably lift a few routines from it.

Bear in mind that this thing generates a COM file, rather than an EXE routine. Check out the February 1985 edition of Computing Now! for more about these things.

With the resurgence of interest in day glow, colour displays on computers seem to have taken on a new meaning of sorts. I mean, it used to be really painful to walk around outside and check out the girls wearing day glow green sweaters. They got into your eye balls and rattled around in the rods and cones for a long time... sort of like an optic pinball machine. However, set up the screen so it shows you WordStar in screaming yellow on green with the menus in light cyan and you'll have no problems with day glow at all.

The flashing boxes which persist in your vision will all but eradicate it.

CN!

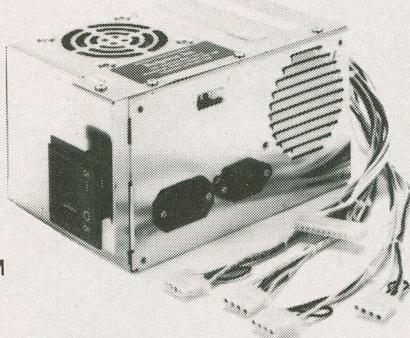
BUDGETRON INC.

IMPORTER/DISTRIBUTOR

1601 Matheson Blvd., Unit 3, Mississauga, Ontario L4W 1H9 Tel: (416) 624-7323 Telex: 06-960172

DEALERS/OEM's ... come to the SOURCE for:

New



Model
CPS-1130M

★ CSA PENDING ★ 130 WATT SIDE SWITCHING POWER SUPPLY

- Upgrade IBM™ PC & XT at Lower Cost Now!
- Direct Replacement for IBM™ 63.5 Watt.

Model	Rating	Output
CPS-1130M	130W	+5V 15A +12V 4.3A -12V 0.5A -5V 0.5A

- Two (2) IBM™ Type Power Connectors to PC Mother Board.
- Fits our PC/XT Side Switch Case.

BACK SWITCH POWER SUPPLIES FOR PC/XT COMPATIBLES



MODEL CPS-1130
CSA PENDING

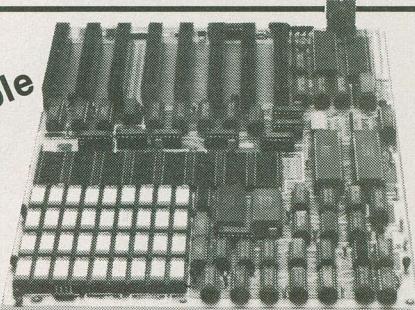
Model	Rating	Output
CPS-1100	100W	+5V 10A +12V 3.5A -12V 0.5A -5V 0.5A
CPS-1130	130W	+5V 15A +12V 4.3A -12V 0.5A -5V 0.5A

IBM™ COMPATIBLE PERIPHERAL CARDS

- Floppy Drive Controller with Cable
- Ram Card
- Multifunction
- Parallel
- Serial
- Colour Graphics
- Monochrome
- Monochrome Graphics with Parallel

IBM is a Registered Trade Mark of IBM Canada Ltd.

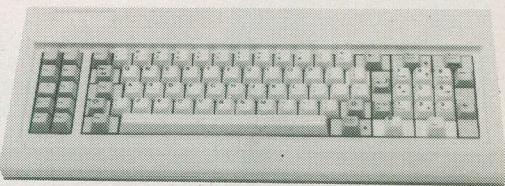
Very Reliable



8 Slots XT Compatible Mother Board

- Fully IBM PC/XT Compatible
- Supports PC DOS, MS DOS, and CP/M 86
- 256K of parity checked RAM
- 8 expansion slots
- Double sided board 8-1/2" x 12" exact fit to our cases.
- All new components/No Bios

Unitech
K-150
Keyboard



IBM™ PC/XT PLUG COMPATIBLE

- Uses German made Cherry Keyswitches.
- Call for Special April Prices.

Shugart SA455

- 5-1/4"
- 1/2 Height
- DSDD
- 360K

Fits IBM™ PC, XT, Port & PC Jr.

*Auto Insert/Eject

*50% Quieter

SA712 10 MB 1/2 Ht. Hard Disk Subsystem

8 SLOT CASES

PC/XT Case

Exact fit to our 100/130W Back Switch Power Supplies

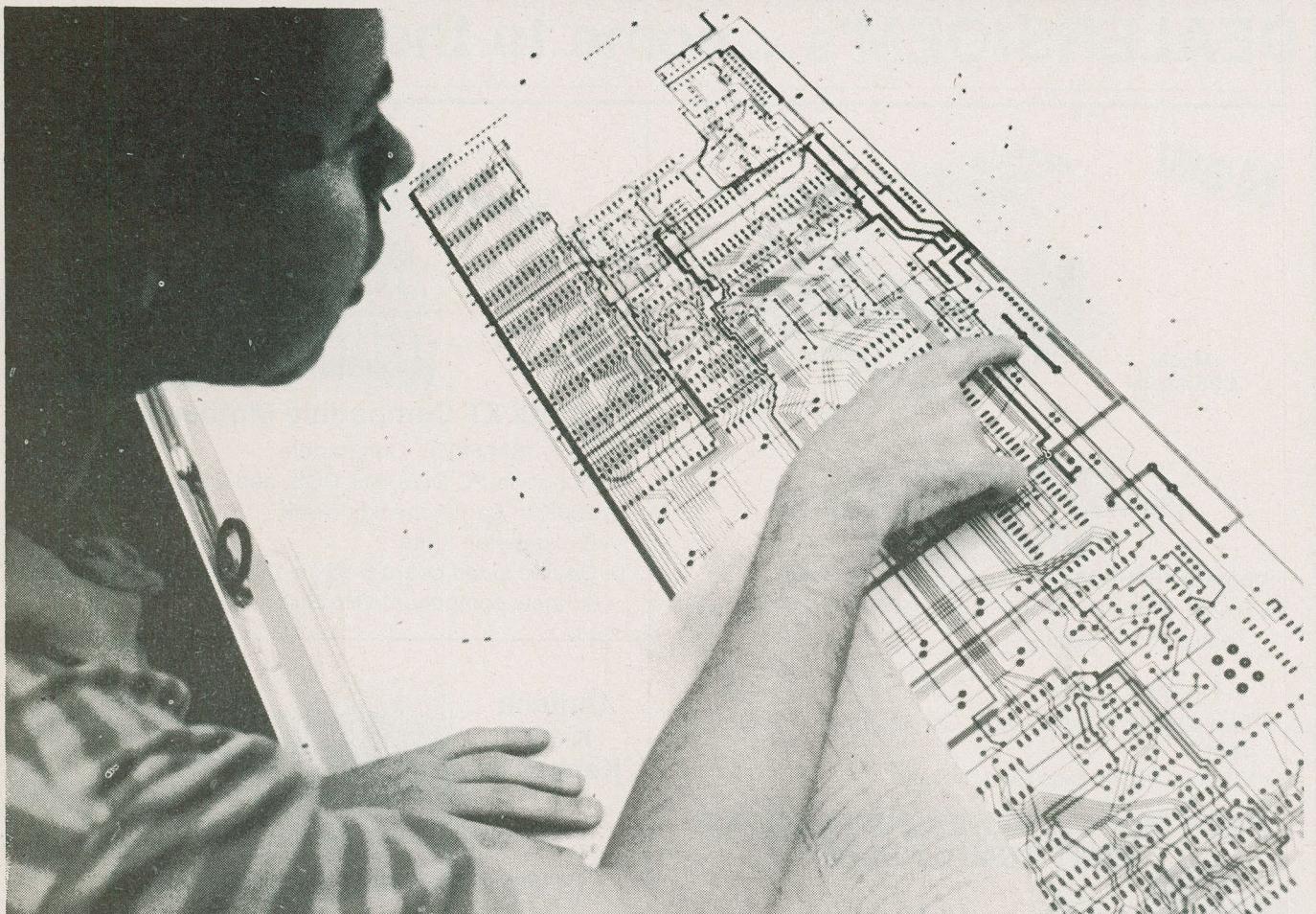
PC/XT Case

Exact fit to our 130W Sides Switch Power Supply

IN-HOUSE TECHNICAL SUPPORT 90 DAY WARRANTY ON ALL PRODUCTS

CALL (416) 624-7323

Built In Canada



Not all microcomputers are imported from the States or the far East. There is a thriving... if somewhat unusual... manufacturing community right here in beaver land.

by Frank Lenk

Microcomputers are awfully useful and usually quite a pile of fun. They look truly impressive perched in a corner of your desk with a potted geranium next to them. They can give even the most slovenly work space a certain *je ne sais quoi*, that much admired aura of high tech.

You might well wonder where they come from, these off white technological toadstools that seem to be springing up all over the place. One imagines them being assembled in sterile environments by robots and blank faced individuals in white lab

coats... or perhaps materialized by jolly little munchkins living in a hollow tree.

After a tour of a few of the local dens of the techno beasts, I'm forced to the conclusion that the munchkin hypothesis is closest to the truth. Far from being corporate megalyths, the companies that build microcomputers in Canada are generally quite small and approachable. They're interesting, too... some people go through their entire lives without ever seeing a wave soldering machine.

Multiflexibility

Eugen Hutka's Exceltronix empire has to be a local success story as far as home grown microcomputer operations go. When I visited Hutka late last year, he was busily moving his operations to larger premises in his Evans road commercial park. At this point the company was making some fifty different products, employing over sixty people, and occupying fifty-five hundred square feet of production space plus another five thousand feet for research and development.

Most of the Multiflex products will be familiar to local buffs. They include S-100 Z80 based systems and 6809 development systems designed for the University of Toronto. The "Surf Board" 6502... an enhanced Apple compatible... system is made for the Surplustronix arm of Hutka's empire, while the "BEST" IBM PC compatible is built under the auspices of BEST Incorporated, yet another offspring.

Similarly, Multiflex has been putting together scrolling news and time display signs for the Toronto subway under contract to its sister company Versadigital.

All the Multiflex design work is done in house, although some board layout work is farmed out to local CAD specialists. Multiflex itself is equipped for the flow soldering, assembly and testing of all its systems.

Upon my arrival at Evans road, I was greeted by several racks of BESTs getting their forty hour burn in... winking their disk drive lights at me. The rear section of the premises was filled with benches at which a number of capable looking individuals were

performing arcane acts with assorted electronic equipment.

At the far back a number of women were engaged in poking and soldering zillions of red LEDs onto Versadigital displays.

Though I didn't know it at the time, I was gazing on one of the most complete computer manufacturing operations in the Toronto area. From board stuffing in the back to assembly and testing at the front... all of the essential operations take place under one roof. Only the printing of the raw circuit boards has to be farmed out.

Through the doors still further back I happened on a substantial looking machine which I was informed was the wave soldering system. Unfortunately this beast was not in use on that particular day. I eventually found that it represented one of the high point as far as local manufacturing equipment... and operational integration. Even the larger companies prefer to farm out their soldering. A wave soldering machine isn't something one buys out of petty cash.

Tucked away into the new office section I discovered some real development under way. A cheerful sort of fellow sat hunched over a drafting table, laboriously laying out circuit traces using several colors of narrow tape. Although the layout is done oversize, you could easily see the benefits of using computer aided drafting.

The Ham Sandwich Theory

At the extremely low end of the size spectrum there exists the "plant" of JLS Elec-



The main plant, executive office and retail outlet of JLS Electronics. Joe Sutherland is hard at work on one of his XT Clones.

tronics. JLS translates as just one individual, Joe L. Sutherland.

Since the time I visited him, Joe has relocated his operation several times. I can be fairly sure of this because the building he was in was condemned when I saw it, and in fact ceased to be almost immediately after my visit.

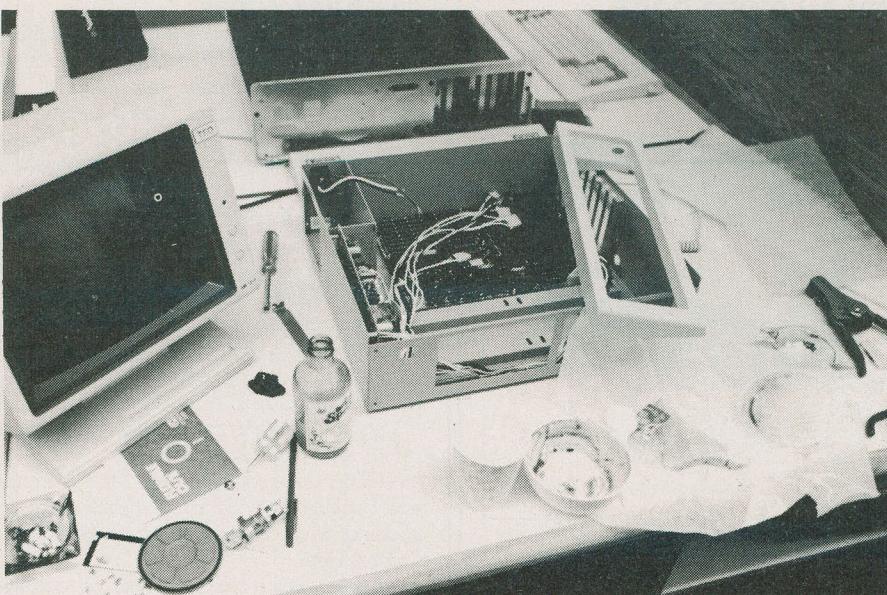
When I was given a Yonge street address for JLS I thought that it would be a large, prosperous company that should be nice and easy to find. It wasn't. I walked past

the place twice, then noticed a big oriental import bazaar that had had a paper banner taped above its doors announcing that despite all appearances to the contrary, this was indeed the home of JLS Electronics. Pushing through the crowded aisles of the store, I finally discovered a narrow staircase leading up to the second floor.

A shelf of disk drives and a very sedate reception desk met me at the top of the stairs. However, beyond these two articles of furnishing, the top floor was largely bare, except for a rack of greeting cards apparently left by the last tenant and a large table surface on which sat several IBM XT compatibles in assorted stages of completion. Joe Sutherland himself, in jeans and rolled up sleeves, was prodding around in one of these boxes... screwdriver, soldering iron and ham sandwich all close at hand.

As Joe says, his is "without a doubt the most hand built" of the local IBM clones. To my eye, it is certainly one of the most appealing. Amazingly, the machine fits into a box about a third smaller than that of a name brand PC. The case was designed by Sutherland himself and built by Fox Metal, with a foamed plastic front face. It is perhaps the only such case that allows the circuit board to extend under the disk drives, saving a whole pile of room.

It is also unusual in that Joe rips his power supplies out of their individual steel enclosures, which contain mostly empty space. These and other tricks allow the case to be unbelievably small, while still allowing room for eight completely unobstructed expansion slots.



Partially assembled JLS XT Clone. Note the custom front panel, key lock (at lower left) and half eaten sandwich (at lower right).

Built In Canada

Joe has even added a couple of other luxury touches. His new plastic front panel... custom molded at great expense so that it could proudly bear the JLS initials... is provided with an easily accessible key lock power switch. The keyboard cable socket is mounted at the side of the metal case, not the back, giving the user an extra couple of feet of usable keyboard coil cord.

JLS started its meteoric climb to success with the fabled "Big Board", a highly regarded CP/M single board system... which is unfortunately no longer available. After the Big Board, Joe created own PC compatible kit, a relatively straightforward clone of the IBM. This system was so successful that soon there were Taiwanese clones of the clone being shipped into town.

Flattered but undismayed, Sutherland had already moved on, evolving the original into the present improved XT board. Joe sold this design to Aftek Business Machines, which in return supplies him with high quality wave soldered motherboards. Even though Aftek is selling its own computer based on this board, Joe goes on hand building about one system a day, doing all the assembly himself.

Fearing assaults from IBM, and suspicious of the existing knock off BIOS programs, Sutherland actually had an IBM compatible BIOS custom written for his machine... even though the hardware is sufficiently compatible to run under the original copyrighted version. Joe's efforts were not in vain, however. IBM, he says, "was our first customer." The JLS BIOS has been pronounced legal.

Of course, all these computing activities are just a sideline for Joe Sutherland. "I'm really a moviemaker," he says. The sale of his XT design to Aftek financed a major film entitled *Freeloading*, based on the operation of the CBC, and produced by Sutherland's own company, "Beyond 1984". The film was eventually to be aired on pay TV, so keep your eyes peeled for it.

The last news of JLS has it that an IBM PC AT clone was in an advanced drawing board state, and that a new 80286 accelerator card for the PC was already complete and on sale.

Don't blink... at press time, JLS was moving into spacious quarters at 2026 Yonge Street.

The Aftek Tapes

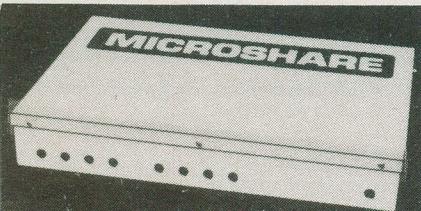
Having read the preceding section attentively, you should have some idea of where Aftek Business Machines, my next visit, fits into the scheme of things. This is a company that is trying to get respectable on the basis of technology spawned in Joe Sutherland's attic.

Actually there is little kinship between Aftek and JLS, beyond the fact that the latter does design work for the former.

The Aftek computer is a fairly standard... full size... PC XT clone. It's about as nice a system as these things come, being built around the impeccable JLS motherboard. Aftek hopes to parlay this machine into a major stake in the business computing game, and has followed up by getting involved in the esoteric world of streaming tape backup. Service for the Aftek creation is being provided under a contract with Control Data.

Aftek takes a pretty matter of fact approach to manufacturing. Its premises in the North end of Toronto include a plush office space as well as assembly, testing and

MICROSHARE



PET/CBM MULTI USER DISK SYSTEM

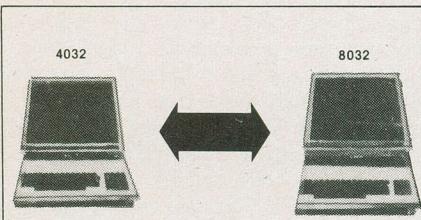
- ALLOWS UP TO SIXTEEN USERS TO SHARE DISK DRIVES AND/OR PRINTERS
- WORKS WITH ALL PET/CBM EQUIPMENT
- 100% HARDWARE INTERFACED
- NO ALTERATIONS TO SOFTWARE OR SPECIAL SOFTWARE REQUIRED
- SOFTWARE TRANSPARENT — WORKS WITH ALL PET/CBM SOFTWARE
- LANGUAGE TRANSPARENT — WORKS IN ANY LANGUAGE
- NO SPECIAL COMMANDS USED
- PROTECTS AGAINST SYSTEM LOCKUP



COMMODORE 64 MULTI USER DISK SYSTEM

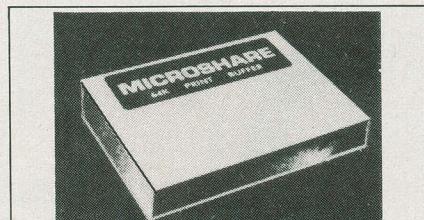
- ALLOWS UP TO EIGHT USERS TO SHARE DISK DRIVES AND/OR PRINTERS
- WORKS WITH ALL 64/VIC EQUIPMENT
- BUILT IN IEEE AND 64/VIC SERIAL PORTS (WORKS WITH ALL IEE Devices)
- 100% HARDWARE INTERFACED
- NO ALTERATIONS TO SOFTWARE OR SPECIAL SOFTWARE REQUIRED — SOFTWARE TRANSPARENT
- NO SPECIAL COMMANDS USED
- BUILT IN 16K PRINT BUFFER
- DISK DRIVE PRIORITY

GREATER PRODUCTIVITY & LOWER COST FOR BUSINESS AND EDUCATIONAL USE



40 TO 80 COLUMN CONVERSION

- EXTERNALLY SWITCHABLE FROM 40 TO 80 COLUMNS
- EXTERNALLY SWITCHABLE FROM 80 TO 40 COLUMNS
- CONVERSIONS FOR BOTH 4032's AND 8032's
- 100% SOFTWARE COMPATIBILITY IN EITHER MODE
- HARDWARE (NOT SOFTWARE) MODIFICATION
- ALL KEYS FROM 8032 EMULATED ON 4032
- SPECIAL FUNCTION KEYS



MICROSHARE 64K PRINT BUFFER

- LOW COST
- REDUCES LONG WAITS — SAVES TIME
- ALLOWS YOU TO PRINT AND PROCESS SIMULTANEOUSLY
- IEEE INPUT — IEEE OR CENTRONICS PARALLEL OUTPUT
- WORKS WITH ALL PET/CBM SOFTWARE
- NO INSTALLATION REQUIRED
- ELIMINATES THE FRUSTRATION OF WAITING FOR YOUR PRINTER

COMMODORE 64, PET, AND CBM ARE ALL TRADEMARKS OF COMMODORE BUSINESS MACHINES, INC.

DEALER INQUIRIES INVITED

MANUFACTURED BY: COMSPEC COMMUNICATIONS INC.
153 BRIDGELAND AVE., UNIT 5,
TORONTO, ONTARIO M6A 2Y6
(416) 787-0617

storage areas. The actual production facility has just been expanded by the addition of an adjacent unit in the commercial complex. One side is now used for the assembly of motherboards and tape drives, with the other dedicated to their final assembly and storage. An affable gent by the name of Bill Leary... a former employee of JLS... gave me a guided tour of the works.

Aftek produces a complete range of systems, starting with a one hundred and twenty-eight K single drive PC and going on up through loaded PC+, XL with hard drive, DL with hard drive and tape backup, and the DL+... a loaded system with two floppy drives, hard disk and tape backup.

There's only a minor amount of solder spilt at Aftek. Like a lot of small and even moderately large manufacturers, Aftek opts to leave the soldering to specialists. Thus the motherboards are wave soldered elsewhere, and arrive ready to be stuffed... loaded with the unsolderable parts that get popped into sockets. Some small modifications were being jumpered onto the boards as I watched, pending a final revision of the design.

Following their assembly, the boards are visually inspected... which saves a lot of chips down the way a bit. Anything that can't be put right in about a half hour goes off the line into a repair and prototyping area.

Boards that test out successfully then get inserted into cases. Aftek has been using stock cases with a custom backplate, but has also been considering the creation of a custom box. No disk drives are inserted during the production process. Instead, Aftek tries to keep a stock of about fifteen systems which can be configured to suit specific orders.

Before leaving, all units get a forty-eight hour burn in, running from eight in the morning to six at night.

The keyboards and peripheral cards that plug into the Aftek computers are all off the shelf. Aftek has been favoring Keytronic keyboards, with the new Keytronic 5151 Selectronic available as an option. The cards come from fairly well known manufacturers, such as Persyst or Quadram. However, Aftek should have its own disk controller cards by the time you read this. The disk drives are from Microscience... they're half heights to leave room for the addition of an optional tape backup.

When I popped by, there were lots of projects brewing at Aftek. The one they were keenest on was a new tape drive from Inter-Dyne. In fact the man from that company's California operation was there to demonstrate the system. It's a self threading cartridge which runs off the disk controller



One section of the assembly area at Multiflex an Apple compatible 6502 system is going together.



The testing area at Aftek Business Machines. A motherboard is getting checked out.

board and allows file by file or streaming backup. A special version of MS-DOS was to be configured for Aftek to support the extra features.

The latest project from Aftek is introduction of a new *Attack* card. Presumably the same piece of hardware mentioned by JLS, this board features the superfast 80286 processor and up to 256K of RAM. This is a real serious bit of hardware, selling for the really serious price of just under five grand.

In spite of its professional, businesslike bent, Aftek is a friendly company. It sells its machines only through dealers, but I was told that buyers "are welcome to call" for technical support... or whatever.

Everybody Else

Oddly enough, it turns out that companies like Multiflex, Aftek or even JLS actually do represent the highest level of personal and business microcomputer manufacturing around. This is not on account of their higher technology or bigger volume. It's just that they're typical of the few companies that bother to do much production at all.

In fact Multiflex was the only operation I came across that goes the whole route in house... from board layout through wave soldering and stuffing right up to final assembly and burn in.

Even a fairly big name company like Nelma doesn't bother with that level of integration. I talked to Adam Naiman, the director of product planning at Nelma Data's Mississauga plant. He said that virtually all of Nelma's real production chores are farmed out. The company deals with wave soldering specialists, sheet metal specialists and even board stuffing specialists.

The usual components... power supplies, drives, keyboards, monitors... are imported whole, or purchased from other companies in Canada. A plastics company named Amnicon is the local specialist in low cost urethane moldings, and supplies decorative case fronts for Nelma... and other local manufacturers.

In the end, what Nelma does sounds a lot like what Aftek does... only on a rather larger scale. Nelma has a total of about twenty-five thousand square feet of plant, comprised of about eight thousand for production, six thousand for service and three thousand for research and development. Production amounts to some board stuffing plus all the final assembly and wiring up.

There's another league of name brand computer companies around town that really does no local manufacturing at all. Teo, run by Carl Teo, produces an Apple type 6502 based computer. Although Teo is bas-

Built In Canada

ed here and had "some design input" on the system, all the production happens in the far East. STM, producers of the Pied Piper CP/M system, are somewhat in the same boat. Apparently the "entire machine" was designed here down to the layout of the circuit board... but it now manufactured in STM's own Hong Kong plant. The same

route was taken by the newer STM personal computer... based on an eight megahertz 80186, and complete with built in modem, full sized backlit LCD display, two 720K disk drives and a thermal printer.

Mountains of Silicon

There are, of course, many other Canadian

high technology manufacturers. Many of the ones scattered around Ottawa, for example, are involved in other areas of computer use, creating sophisticated terminals and minicomputer support hardware.

The microcomputer builders, however, are all decidedly small. They're run by individuals, rather than by boards of directors, and produce what is probably the most essential... and overlooked... commodity of the advance of microcomputer technology.



INTERNATIONAL LTD.
(416) 298-3280
Telex - 065-26150

Service Centre and Retail Outlet. 4051 Sheppard Ave., East, Agincourt, Ontario M1S 1S8
Japanese Parts Specialists — Parts 100% guaranteed

RAM'S	EPROM'S
4116-200NS or 150NS	\$ 1.25
4164-150NS	\$ 3.75
41256-150NS	\$25.00
STATIC RAM'S	CPU
2114 200NS	\$ 1.85
2016, 2116, 4016	\$ 7.00
6116P 150NS	\$ 7.00
HM6264 LP-15	\$35.00
5514AP-2	\$ 4.50
4416, 120NS 4K X 16	\$ 9.00
5514 AP-3	\$ 4.50
8088 SYSTEM 65/SET	DISK DRIVE
(8088, 8237A-5, 8255A-5, 8259A-5, 8284, 8288D) 7 Chip Set	IBM Compatible Panasonic JA551-2 (same as Shugart SA455)
DX85	XT PC PERIPHERALS
	a) Super XT Main Board (No ROM)
DX38	b) 512K RAM Card (OK)
	c) Multifunction Card (OK) AST Compatible
\$19.95	d) Monochrome Card
DX85 5-1/4 Floppy Disk Case (storage up to 150 diskettes) Lock included	e) Monochrome Graphic Card
\$24.95	f) Disk Drive Card
5A Hydro approved Switching Power Supply (for Apple)	g) RS-232 Card
\$79.00	h) Printer Card
15A, 130W Switching Power Supply for IBM PCB's Japan	i) Game I/O Card
\$169.00	IC Socket (Double Side)
Apple Compatible Peripherals	28 pin Double Side
a) 128K RAM Card	10 for .30 ea.
b) 16K RAM Card	
c) 80 Column Card	
d) Disk Controller Card	
e) Z80 Card	
f) Communication Card	
g) 40/80 Col. soft switch	
TRANSISTOR	
2N3904 — .18 ea. 10 — .15 ea.	
2N3906 — .22 ea 10 — .20 ea.	

Mail Orders: Send a certified cheque or money order plus \$4.00 for shipping and handling. For Special Delivery, please add \$1.00 extra. Ontario residents add 7% P.S.T. Visa & Master card accepted.

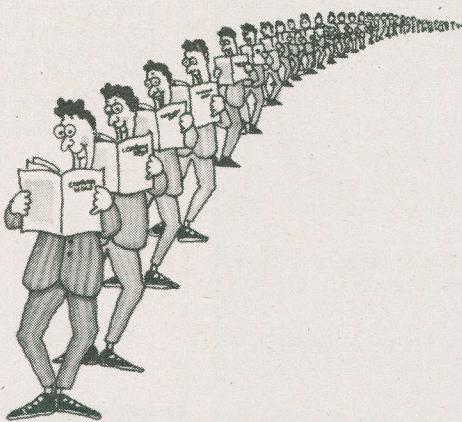


The board stuffing line at Multiflex, with an 8088 motherboard being populated.

They do up affordable, reliable computers with short delivery times and easy access.

Much of the success of the small local builders can be attributed to their size. In the time it takes a company like IBM to get everyone together for a strategy meeting regarding the next system to start thinking about, the likes of Joe Sutherland can be half way through building a prototype. **CN!**

Last Year 12,416 Canadian Businessmen spent \$19.95
for Computing Now! Magazine...
They Also Spent Over *\$39,000,000 on Computers
and Related Materials



*In fact the total readership spent over \$133,000,000.

COMPUTING NOW! is purchased and read by more businessmen than any other computer magazine in Canada: 47% more! When searching for the right advertising venue to reach the Canadian business market you should bear in mind that 12,416 readers of COMPUTING NOW! are businessmen who will specify the purchase of *\$39,000,000 worth of computers and related materials this year.

68% of reader service card respondents are in management, executive or top scale professional positions, and 98% stated that the advertising in COMPUTING NOW! influenced their buying decisions.
COMPUTING NOW! delivers the largest paid circulation to Canada's pre-qualified computer business market.

Please call or write for a media information kit.
MOORSHEAD PUBLICATIONS
25 OVERLEA BLVD, SUITE 601
TORONTO, ONT.
M4H 1B1
(416) 423-3262



"THE STRONGEST ADVERTISING
BYTE IN CANADA"

COMPUTING NOW!
SOFTWARE NOW!
ELECTRONICS TODAY
COMPUTERS IN EDUCATION

Almost Free PC Software Volume II

A good program is like a good politician . . . no, wait, we've succeeded in finding some good programs. However, it did take a lot of searching. Presented here is a selection of some of the best utilities, games, programmers' tools and business applications ever to order the bytes on a disk.

Sweep is a turbocharged Ferrari of a disk utility which makes the COPY command look like a goat herd by comparison. It allows one to do mass copying, deletion, renaming and other disk functions all in menu driven comfort. It supports essentially the same command structure and behavior as the CP/M Sweep and Disk programs.

Worldmap is a sophisticated graphics program which draws a very detailed picture of the planet we live on and daily endeavour to blow up. It will display its wares on the tube or send them out to a printer.

Anitra plays Anitra's Dance by Edvard Grieg. PC music programs are a gas . . . everyone should have a disk full of them.

Ramdisk is among the most useful of all the utilities you'll ever plug into your PC. It creates a virtual drive on your system out of memory. You can pop your files over to it when you boot the beast and thereafter experience disk accesses that take less time to complete than real drives take to turn on their LEDs.

Alien plays a bizarre adventure game. It leads you into some pretty warped places. It comes with a massive data file for an adventure that you won't get tired of 'til the dragons come home for the evening.

FOS is a personal financial manager which will, among other things, make your cheque books into servants of humanity as opposed to denizens of the aforementioned adventure game. It's thunderously slick.

Jukebox represents yet another PC music system. This one comes with a host of songs to play and some really electric graphics.

Asmgen is one of the best text disassemblers we've come across. It takes any executable COM or EXE file and produces an assembler listing. It's surprisingly good at distinguishing between code and imbedded data or text. If you have need to patch or modify code this thing will outdo DEBUG by light years.

Struct will appeal to the rabid programmer in everyone. It allows MASM to be used to assemble a sort of higher level language. Included also is a test file to illustrate the syntax.

Prtsc replaces the internal PC screen dump code with something more suited to reality. It allows one to hit the PrtSc* key and then select what the screen dump will look like from a menu. It supports a number of popular printers.

Breakout plays a PC version of the popular game. It will accept input from either a joystick or the keyboard. The graphics are good and the action is adjustable from a beginner's level right up to fast and nasty.

Util is a collection of system utilities all under one menu driven roof. Among its many talents are a sorted directory, keyboard redefinition and the facility for scrolling up and down through a text file.

All of this software is available on a single disk. It comes with extensive on disk documentation to explain how to make it do its things. The whole works cost a mere

\$19.95

Almost Free PC Software Volume II
Computing Now! Magazine
25 Overlea Boulevard, Suite 601
Toronto, Ontario M4H 1B1
Ontario residents please add 7% sales tax.

Or Order it by phone on your Visa, Mastercard or American Express. Call 1-423-3262 during regular (EST.) business hours.

Fine Print: This software is *all* in the public domain. It is offered here without charge. The price of this package defers our cost in collecting and preparing it, the cost of the media, postage and handling.

While we have made every effort to ensure that this software is functional and will do what it's supposed to, we are unable to offer technical assistance in adapting it for your application.

The Most Valuable Computer Product In Existence

We Offer You Answers

It has been said that computers are the most flexible tools human beings have ever created. This flexibility, however, comes with its price. They are also the most complex.

You are probably an expert in your own field of endeavour but, unless that field happens to be microcomputer applications, you will quite possibly find that you'll be unable to apply computer technology to its fullest potential.

Computers bring with them incredible power . . . and a whole universe of perplexing difficulties.

In creating Computing Now!, Software Now!, Computers in Education, Electronics Today and numerous special publications we have had to become experts in applying microcomputers. We write about them and we use them in the creation of our magazines.

For the first time we are offering our expertise and experience on a consulting basis. We will sit down with you and find solutions to your problems on a one to one basis. We will do it impartially . . . we are not connected with any software or hardware manufacturers and, most important we will advise you based on the latest developments in the industry. We very often know about things which affect microcomputer decisions long before they are released.

For more information contact

**Moorshead Publications
Consultation Services**

1-416-423-3262

or write

Halvor W. Moorshead

The Moorshead Group

25 Overlea Boulevard, Suite 601

Toronto, Ontario M4H 1B1

OVERLEA TECHNICAL SERVICES

Moorshead Publications has the capacity to serve you economically in two areas of expertise:

TECHNICAL WRITING: The combination of technical understanding, literary ability, and a grasp of the reader's needs can be a rare talent indeed. Our writers have extensive experience at writing documentation and articles for both technical and non-technical audiences.

PRODUCT PHOTOGRAPHY: Studio photography with small or large format cameras, in either colour or black-and-white, can show your product in its most appealing way. Various sets and backgrounds can be arranged, as well as special processing effects through professional colour labs.

If you cannot support full-time employees for these services, or you just need to reduce the workload, contact us at the address shown below:

William Markwick
Overlea Technical Services
A Division of Moorshead Publications
25 Overlea Blvd.
Toronto, Ontario M4H 1B1
(416) 423-3262

Macro Assemblers for the Apple



The splendid glacial slowness and funky syntax of BASIC soon loses its charm. If you think you've taken your Apple about as far as fruit can go it's probably about time you got into an assembler. Here's a look at two of the best.

by Frank Lenk

As soon as you outgrow Applesoft and the wonders of Integer BASIC, you'll probably begin questing around for a decent high level language for your Apple. Chances are you discover that there just is no huge assortment of languages for the machine. In reality, machine code is about the only way of getting the most out of the prehistoric 6502.

The Apple comes with its own assembly language tools... in the form of the mini-assembler tucked into Integer BASIC. Mini-assemblers aren't terribly good even for doing small patches, and are hopeless for writing expansive programs even if you are unspeakably determined.

There's no doubt about it... a good assembler can make programming a pleasure. Fortunately there are at least a couple of really fine macro assemblers now available for the venerable Apple II + ... and its illegitimate relations.

Not the BASICS

To qualify as a *bona fide* assembler all a program has to do is translate mnemonic commands into the kind of binary pseudo-garbage your CPU feels happiest with. That is, it takes source code... a somewhat readable set of instructions, or "opcodes"... and turns it into *object* code that the processor can actually execute.

A true assembler lets you substitute labels of your own choosing for numerical constants or memory addresses. This lets you define logic branches in relation to the logic itself, rather than to arbitrary and rigidly defined locations in memory.

Most assemblers add commands called *assembler directives* or *pseudo ops* that can be used just like the standard CPU opcodes but which are executed by the assembler program itself. For example, the directive ORG has no binary equivalent and is meaningless to the 6502. It simply tells the assembler where to put your object program. It defines the starting address, or origin of the machine code.

Pseudo ops such as DFB, for "define byte", or ASC, for ASCII text, are a convenience, allowing the programmer to insert data into the object code.

A macro assembler goes a bit beyond this. It allows one to define brand new, custom made pseudo opcodes which will be substituted by the assembler for chunks of actual code. For instance for a machine language program to output a line of text it will have to find the ASCII data, loop through the data while calling some sort of screen handling routine in order to spew out the data a byte at a time and then recognize when the data has run out.

Macro Assemblers for the Apple

This often used subprogram could be written once and then saved as a ten to twenty line macro, say PRINT. Now when you want your program to print, you can insert the PRINT command, just as you might in a BASIC program.

Naturally there's a price to this. If you define an operation as a subroutine then execution will be delayed while the CPU does the relatively slow JSR and RTS to find the actual code. A macro looks about the same in your source program, but will actually insert the entire subroutine into the object code every time it is invoked... taking up a lot more room in RAM, but running a good bit faster.

This is much like what happens in your typical compiler... high level instructions are replaced by stock machine language routines from a large library. Any decent macro assembler will come with some sort of library of macro functions.

Good commercial assemblers, macro or otherwise, will also include lots of little amenities. For instance, some sort of editor

is pretty much a necessity. Most word processors will fill the bill, but an integrated, co-resident editor is quite a luxury.

Furthermore, because memory is limited and must hold both the source program and the assembled object code, any good assembler must have some commands for disk interaction. The programmer

In the case of the slightly bizarre Apple system an assembler should save RAM space by residing in the sixteen K language card... a highly recommended bit of hardware if you plan to do much programming. The software should also support the common eighty column display adapters. Assembly code runs long and narrow, but a forty column screen can easily become overgrown if you like to add comments.

There are really only a couple of choices in macro assemblers for the Apple. The two chief competitors nowadays are Merlin, from Roger Wagner Publishing... originally Southwestern Data Systems... and the S-C Macro Assembler, from S-C Software Corporation. These two packages have managed to survive a shake out that saw the demise of several other assemblers. The once popular LISA... Laser Interactive Symbolic Assembler... failed to make the upgrade into macros, while ORCA/M from Hayden turned out to be too powerful... and too hard to use.

A good assembler can make programming a pleasure.

generally gets the option of assembling object code directly onto the disk rather than into RAM, and of assembling a series of source code files directly from the disk.

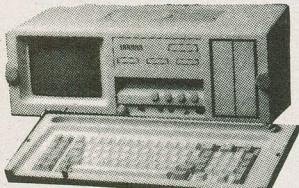
P.C. Compatible



ECS1-PC
\$1295.00

- 8088 processor • optional Intel 8087 numeric coprocessor • 64K memory exp. to 256K • double sided double density disk drive • detachable keyboard
- colour-graphic board • 100 watt power supply • support PC software
- 90 day warranty

ECS6 Portable
Introductory Offer \$1195.00



- Dual Processors 6502 and Z80
- 64K Ram Controller Card
- Hi-Res 9" Amber Monitor
- Detachable Keyboard with Special Functions.
- Disk Drive
- 90 Day Warranty

NOW
OPEN

ECS4 Systems



\$1179.00
Special
\$995.00

- dual processor 6502 and Z80 • 64K RAM • controller card • disk drive • Hi-res 9" amber monitor • colour graphics • detachable keyboard with special function • 90 days warranty.

XT/PC MAIN BOARD \$375.00

- PC Compatible bare Board \$ 39.00
- Multi function card \$175.00
- PC Compt. Case \$ 79.00
- PC Compt. Power Supply 15 amps 130 watts \$139.00
- PC, Half height Hitachi Drive D.S.D.D. \$219.00

DISK DRIVE \$219.00

- Apple II Compatible Shugart 390L \$249.00
- Slim Line Teac \$49.00
- Z80 \$55.00
- 16K Ram \$45.00
- Disk Controller \$69.00
- 80 Column \$199.00
- Light Pen \$38.00
- Joy Stick \$79.00
- 5 Amps Power Supply \$159.00

ECS

1590 Matheson Boulevard, Suite 1 & 2 Mississauga, Ontario L4W 1J1
(416) 625-8036 Hours — Mon. to Fri. 10-6, Sat. 10-2

Circle No. 17 on Reader Service Card

Don't Be Anyone's APRIL FOOL Why Pay Up To \$25 A Box When Buying Diskettes?

Impressive Names, Performance Claims and Packaging mean only one thing . . . HIGH PRICE.

Chameleon has the Alternative

HIGH QUALITY, FIRST GRADE, blank box diskettes at LOW, LOW WHOLESALE prices.

Made for us by a major manufacturer, with your satisfaction guaranteed.

Single Side, Double Density \$14.95/box/10
Save Even More \$139.95/case/100

MAIL ORDERS: We accept Certified Cheques, Money Orders, VISA, Mastercard, AMEX (include Card Number, expiry date and signature). Add 10% for shipping and handling. Ontario residents add 7% P.S.T.

Chameleon Universal Products

186 Norfolk Ave., Richmond Hill, Ontario L4C 2C8

Dealer Inquiries Invited

Circle No. 35 on Reader Service Card

Kick the Tires

Merlin, by Glen Bredon, is a comprehensive tool kit for dealing with the mechanics of Apple assembly code. It calls itself "a TED based editor assembler"... that is, one which "adheres to almost all of the conventions associated with TED II+." For those not familiar with TED, suffice to say that it is one of the nicest little pieces of freeware you can acquire. In fact, a shocking amount of commercial software has probably been developed using TED.

The S-C Macro Assembler has also gone through several public domain incarnations before arriving at its present form. Like Merlin, the S-C assembler is also the work of one individual... in this case, Bob Sander-Cederlof. However, S-C is quite different from Merlin in character.

The neatest thing about the S-C assembler is that it thinks it's Integer BASIC. Like Merlin, S-C can live in the language card. However, S-C uses the same system tie ins as Integer BASIC. This lets you use any DOS command directly from the S-C command prompt just as you would in

BASIC. Thus, where Merlin uses the VID command to switch to 80 column display, in S-C you use the well known PR#3.

Furthermore, typing FP at the prompt drops you into Applesoft. Type INT at the BASIC prompt and bingo, you're back in the assembler.

Merlin uses a simple menu for file operations. This menu greets you when you boot, and can be reached later on by typing the command Q at the editor prompt. From the menu you can: save and load source files, save object code, see a disk catalog, re-enter the editor assembler proper, and quit entirely.

The append command merges programs by dropping a second source file just below whatever's already in the editor. The read and write text file commands input from or output to various other assemblers, or even a word processor. The S-C Assembler does somewhat the same thing, but using its TEXT command. This outputs source as a text file, with or without the line numbers. Thus it is possible to transfer programs between S-C and Merlin, if you're

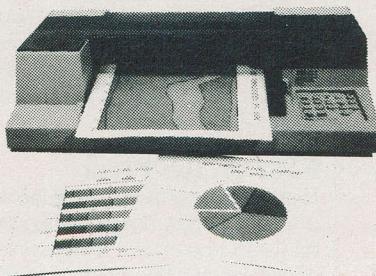
willing to search and replace for the mismatched pseudo ops.

Quitting the Merlin menu drops you into dreaded Applesoft. However, fear not, for you can re-enter the assembler menu by entering the command ASSEM. Merlin is heavily tied into DOS in order to intercept this command, thus making it incompatible with most of the fast custom DOS's. Earlier versions seemed to use this tie-in as part of their copy protection mechanism, a feature mercifully missing from the latest Merlin.

The editing environments of Merlin and S-C are extremely similar. Both use a colon as a prompt. Both implement line editors that conform to the standards set up by the GPLE Applesoft line editor. In Merlin you type E and a line number... in S-C you use control E and a line number. Either method brings up the desired line and puts you in the edit mode. The obvious insert and delete control codes... control I and control D... do their usual magic in both systems.

Merlin's editor commands come in all shapes and sizes... four letters long, such as TABS, MOVE, TEXT, three letters, MON,

Quality Graphics with the HP 7475 Graphics Plotter



HP's 7475 6-pen graphics plotter gives you quality graphics on paper for reports or on overhead transparencies for visual presentations. Multicolor, professional graphics are ready in minutes! Team up with HP's 7475 with your computer today, and get the graphics edge!

Sale priced at
\$2,600.00*
7% P.S.T. Not Included

Overhead Transparency Film	\$50.00 per 100
MG200 High Quality Plotting Paper	\$30.00 per 500
Paper O/H Transp. Pens	\$9.45 per pkg. 4
Delivery from stock.	Circle No. 19 on Reader Service Card

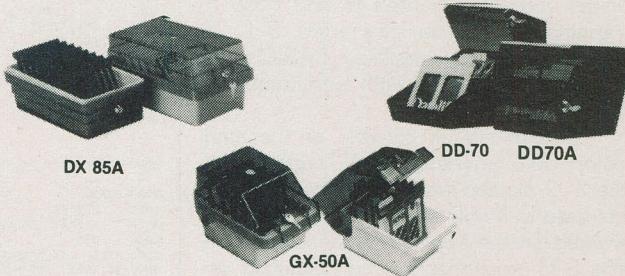
 Management Graphics
2064 Avenue Road
Toronto, Ontario M5M 4A6



(416) 485-2855

Circle No. 39 on Reader Service Card.

Dealers!! Accessories At The Lowest Prices



Diskette Library Cases 5-1/4" & 3-1/2" in types



Joysticks Apple/IBM/Commodore/Atari
Attractive Quantity Discounts Available
Contact us for more Details

Gentek

Computers Inc.

Dealers Only Please

416-665-0234

228 Canarctic Drive
Downsvive, Ontario M3J 2P4

Circle No. 5 on Reader Service Card

Macro Assemblers for the Apple

ASM, two letters FW, HI and single letters for deleting lines, editing, inserting lines, adding lines and list. The single letter commands are certainly the most welcome.

Many of the commands are as inscrutable as they are powerful, even when one is armed with the manual. W, for example, gives the location in memory in hex of the start of a source line. TEXT converts all spaces in the source file to inverse spaces. I still haven't quite figured that last one out, but don't despair... FIX undoes the effect.

Merlin's edit, change and find commands can have W appended to them, ... as in FW, CW, FW... to act only on complete words. Also included are very neat line COPY and MOVE commands, as well as C, for change, which does a search and replace on strings. VID lets you switch back and forth between the forty and eighty column displays.

The editing commands in S-C are not quite as comprehensive, but are generally more straightforward. All the prompt level commands are three letters long. Thus you can use LIS for list, REP for search and replace and REN for renumber. The only exception is MNTR, which drops you into the Apple monitor. Of course, the DOS commands must be entered exactly as usual, such as CATALOG or SAVE.

In Merlin the line numbers are arbitrary and not associated with specific lines. The insert command is used to add code by pushing the existing lines down. S-C, on the other hand, emulates BASIC's line numbering, complete with auto numbering if you want it.

Though not as invisible as the mandatory auto numbering of TED and Merlin, the S-C method would be easy enough to get used to if only the renumber command worked like the Applesoft of the same name. The S-C renumber has no delimiting option, so you can't renumber blocks of lines. Renumbering always goes from a starting line to the end of the source.

The only good reason to have redefinable numbers at all is so that you could use specific numbers to identify block sections of source code. For instance, it would be nice to stick all of your label definitions in lines one hundred to nine hundred and ninety-nine. Unfortunately, the lack of block renumbering spoils this notion.

This same scheme probably results in the absence of a block move command in the S-C Macro Assembler. The move function is taken over by COP, for copy, which is really the same thing but without deleting the original block. However, COP does not modify the line numbers automatically, thus getting you into another renumbering situation.

```

0001 *-----*
0002 * S-C ASS'Y EXAMPLE *
0003 *
0004 * not to be preceeded *
0005 * by funny header msg *
0006 *
0007 * (C) F Lenk, Nov *
0008 *-----*

0010 *-----*
0011 ZZ.BASE .EQ $6000 start of object code
0013 .OR ZZ.BASE init byte counter
0015 *.TF EXAMPLES.# (remove * to save object code)
0016 *-----*

0100 * Constants:
0102 CR .EQ $8D <carriage return>
0104 SP .EQ $A0 <space>
0120 * Apple locations:
0122 HOME .EQ $FC58 <clr screen>
0124 COUT .EQ $FDED <char output>
0132 PRLOC .EQ $33 <prompt loc'n>
0142 KEYIN .EQ $0200 <input buffer>
0158 KEYC .EQ $C010 <clr buffer...>
0160 GETLNZ .EQ $FD67 <input a line>
0172 PROMPT .EQ $81 <new prompt...>
0182 CHRN .EQ $09 <storage...>

0200 *::::: MACROS :::::
0210 *::::: emits :::::
0215 .MA EMITS
0220 LDX #$00
0225 :1 LDA J1,X output a message
    init counter
0230 JSR COUT load 1st char
0235 INX output a char
0240 CPX #J2 next char...
0245 BNE :1 any more?
0250 .EM if so, loop back
0255 * J1=out address the end.
0260 * J2=no. of chars

0575 *::::: add16 :::::
0580 .MA ADD16 N1,N2 16-bit adder
0585 GLC clr carry bit
0590 LDA J1 get low byte
0595 ADC J2 add to other low byte
0600 STA J2 store over top of it
0610 LDA J1+1 get first high byte
0615 ADC J2+1 add to other high byte
0620 STA J2+1 store over it
0625 .EM ...and you're done!
0630 *.answer onto P2...
0640 * J1=first number
0645 * J2=second number

0650 *::::: input :::::
0655 .MA INPUT input a line
0660 LDA KEYC clr buffer
0665 LDA #PROMPT get a nifty new prompt
0670 STA PRLOC ..and set it up
0675 JSR GETLNZ get a line
0680 STX CHRN store # of chars
0685 .EM

1000 ***** main! *****
1009 START
1010 >INPUT what the heck, get a line, eh...?
1020 >EMITS HIYA,10 send a message
1030 RTS and come home again...!
8000 HIYA .AS -/WELL HELLO/. (the message...)
9900 ZZ.SIZE .EQ *-ZZ.BASE calculate length of object

A typical S-C assembler source.

```

The assembler directives are largely similar in Merlin and S-C, but Merlin definitely wins on the number of specialized pseudo ops. Directives like PAU, for pause, and ERR give one interactive control during the actual assembly process. The opcodes LUP and ' ' can be used to surround a section of code you want repeated a given number of times. My favorite is CHK, which automatically inserts a checksum in the object code.

Still, S-C gets points for friendliness. All of its pseudo ops are defined by a period and two letters. For instance, ORG for the object origin becomes '.OR'... This may not be totally standard, but it sure makes pseudo ops easy to spot when you're plowing through many pages of code.

S-C and Merlin both handle macros in very standard fashion. In Merlin a macro starts with the macro pseudo op MAC... labelled with the macro name... and ends with either EOM or <<<. In S-C the same thing is accomplished by .MA *macro name* and .EM directives. To insert the macro in your code Merlin uses the form PMC *macro name* or >>> *macro name*, while S-C expects just > *macro name*.

Both Merlin and S-C use a square bracket followed by a number to represent quantities to be replaced from a set of parameters given by the macro call statement.

S-C offers the immense convenience of private labels... a colon followed by a number... which are local to the macro and can be freely re-used elsewhere. Actually, local labels can be defined anywhere within an S-C program using a period followed by the label. These are read as extensions of the last explicit label, and are valid only until the next real text label. This sort of thing is a fabulous comfort to those of us who tend to run short of label names or screw up our code entirely by re-using labels we've already assigned.

Both systems allow for conditional assembly. Surrounding a section of code by the structure DO *expression*... ELSE... FIN will cause the commands to be inserted into your object code only if the expression following DO evaluates as true during assembly. This lets you easily create multiple versions of a program using a single source listing. Merlin is more interactive... it can even prompt the user to make a decision during assembly on just what should be included or excluded.

Four on the Floor

Neither of these two assemblers has much of a lead in terms of computing power. S-C still lacks one or two features of Merlin, but makes up for this in general ease of use. Where Merlin tends to be sort of mechanistic, S-C is much more organic.

The S-C assembler is supported by its own publication, *Apple Assembly Line*, which has been responsible for maintaining feedback between S-C Corporation and the users of its software. The result has been a program with virtually no rough edges.

On the other hand, the Merlin system throws in some excellent utilities. The star attraction is SOURCEROR, a really slick disassembler that has the ability to insert standard labels into its source listing to identify important Apple addresses. XREF lets you print a cross reference listing of all the labels in a source file. STRIP shortens a source file by removing all the comments. PRINTFILER saves object code as a text file,

for inclusion in documents or shipping over the phone by modem.

The latest version of Merlin comes with a paperback manual. Suspicious as ever, I flexed the heck out of the binding, but it never dropped a page. As for the contents... the layout of the commands and pseudo ops is by 'logical' sequence of what the operators do. I didn't find this layout as obvious as it might have been, but it's still among the better manuals I've seen. A fold out reference card would be a neat addition... and Roger Wagner Publishing mentioned that something may be done about this in the near future.

The manual also includes tutorial sections for the beginner, as well as some high level background on using the Sweet 16 interpreter and on programming the new 65C02 CMOS 6502 chip.

The S-C Macro Assembler scores high on convenience. Witness such commands as MGO... equivalent to a BASIC CALL or a monitor G. To use MGO, you assign a label to the entry point of your object program... let's say it's START. Now when you run an assembly on your source you can test the assembled code by entering the command MGO START. Assuming that you haven't attempted to clobber anything actually used by the assembler, you'll see your program in operation. When it hits an RTS instruction you'll drop back into the S-C editor with your source program intact and ready for more editing.

SYM is a command that lets you view the symbol table... a listing of the hex values for all the assigned labels... at any time. By comparison Merlin doesn't make its symbol listings quite as accessible, but it does provide two tables on each assembly... one in numerical and a second in alphabetical order.

Appending source files in S-C is not as easy as it is with Merlin's Append command, but it is sensible. S-C uses the same system as the Applesoft renumber utility. You type HID, for hide, load your second source file and finally use MER to combine them.

Another neat feature under S-C is that comments don't have to be preceded by the usual semicolon. Any text clear of the normal operand field is assumed to be a comment. Furthermore, S-C accepts lower case entries anywhere... provided you've suitably souped up your old II+ or clone.

The S-C manual is a minor masterpiece. The commands and directives are well laid out and well explained. The appendices are very clear on memory usage, customizing procedures, printer interfacing and such. The chapter on 6502 programming is an invaluable reference, being a good condensation of things that even real wizards will rarely bother to memorize.

Even the S-C index is top notch... and far superior to Merlin's. Where as Merlin indexes only its commands, S-C indexes everything. For instance, look for entries under "lower case", "language card" or "comments". The S-C quick reference card condenses virtually everything you really need to know about both the assembler and the Apple system, making a manual almost superfluous.

ASM and Quit

It's really hard to choose between Merlin and S-C. These are both uniquely well crafted pieces of software. If you're still a bit intimidated by those hulking MS-DOS systems, try comparing either Merlin or S-C with the standard 8088 assembler, Microsoft's ungodly MACRO-86. You'll find that the Apple has been blessed by a couple of the slickest programming environments ever devised.

If you're into serious programming you owe it to yourself to get into one of these programming tools. Macro assemblers are really the way to go if you want to squeeze a bit more juice out of an eight bit fruit.

CN!

Introducing the Smart-Money Modem

At \$550 or less, Signalman Mark XII gives you more smarts for the money than any other intelligent modem.

Features like: All low-power CMOS circuitry including microcomputer. Hayes command structure. RS-232C interface with built-in cable. Bell 212A compatibility. Limited two-year warranty. Automatic or manual answer/originate calls at 1200/300/110 bps. And the support of the leading independent modem maker - Anchor Automation.

All this for a price that saves you important money. How can an Anchor 1200-baud modem cost so little?* Why not ask the others how they can cost so much!

For the name of the Smart-Money modem dealer near you, call Computron - Toronto (416) 477-0828 Edmonton (403) 489-8400.

Computron

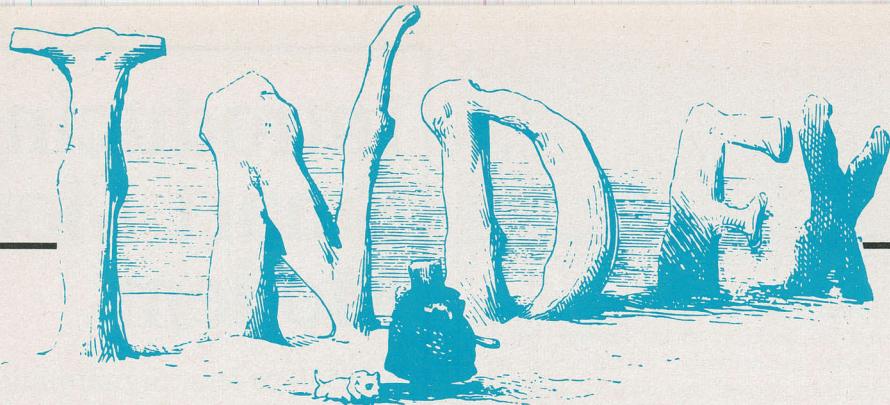
Head Office:
17507-107 Avenue
Edmonton, Alberta
T5S 1E5

Toronto:
55 Torbay Road, Unit #2
Markham, Ontario
L3R 1G7



*Ask about volume discounts

Signalman is a trademark of Anchor Automation, Inc.
Hayes is a trademark of Hayes Microcomputer Products, Inc.



to the Second Volume

Looking back into the mists of time... it might just be smog,
actually... might not we see a glorious and sweeping
history. Yes, it's volume two of Computing Now!...

April 1984 — Computer Survey

Survey of 150 Computers
Add CP/M to Your 64
Macintosh Review
Three Packages
Assembler on the IBM
CBM Printer Interfacing
Clef Hanger for the Apple
SID Symphony
DFX Review
The Toronto Stock Exchange
Converting the Heathen Program
Index to the First Volume

May 1984 — Printers

Revenge of All the BBS Numbers
Poker
Data Base Managers
Turbo Pascal
The New Printers
C64 Peripheral Survey
Morrow Review
The Apple II Something
Don't Shoot the Printer
Software Buccaneers
The Fruit Crate BBS
LIST! Special
SSM Modem Review
Get SMARTS
Search for WordStar
Word Processing Survey
Forth
The Doctor's Little Black Computer

June 1984 — PC Special

MacWrite
What is a LAN?
Hexes and How to Throw Them
Three Blue Clones
IBM Bandit
Charlie Meets the Interrupts
What is MS-DOS
Rescue your 64
Nybble Copiers
Stockboy III
Charts Unlimited

July 1984 — Portable Computers

Lug Abouts
InfoMart
Digging up CP/M
Drum Card Review
Attack of the Metrons
HP 150 Touch Screen Review
Portable Computer Survey
The Hacking of MDM7
JoyGraf
Big Mac
Popular Business Software
Outsmart the SmartModem
The IBM Serial Interface
Stockboy IV

August 1984 — Paraphernalia

Directory of Paraphernalia
Xerox Service Centres
Harbourfront
CN!'s Most Asked Questions
dBASE II Report Generator
Dimension 68000 Review
TRS-2000
IBM Telecommunications
CP/Mapper
Opening the Magic Window
Business On Line
A Small Potful of BASIC Routines

September 1984 — Computer Survey

Godzilla Meets All the BBS Numbers
Survey of 150 Computers
Computerizing the Accounts
Computer Museum
Sight and Sound for the Apple
Classic Music Machine
Graphics Tool Kit Review
CBM 8296
Character for the IBM PC
Down to the Ships in C
Stockboy Menu
CP/M's Good Host
Birth of a Hero

October 1984 — Programming

Computers Across The Pond
New Shoes for the Commodore 64
A Night Out With IRMA
Celestial Mechanic for the IBM PC
The Apple IIc Reviewed
The IBM PC AT
A Plethora of Languages
BDOS in BASIC
Two Apple Hacks
Hashing on the Apple
The CP/M Sorted Directory

November 1984 — PC Special

The Legal Computer
Replicate in VisiCalc
Educational Software
Programming in dBASE II
The Otrona 2001 Review
The PC Proto Card
Survey of PC Compatibles
A Voice for the PC
New Tricks for an Old DOS
The Electric Disk Troll
Apple WordStar Lightning
Two Bits More for the 64
The Bitcracker

December 1984 — Computer Music

Inside MIDI
Software Piracy and the Law
Ten Months After
Great Ways to Fry A Floppy

Rumours from My Bookshelf

Bondwell 14 Review
Invasion of all the BBS Numbers in the World
Time for the PC
Green Eyes
Computer Music Survey
CP/M Silicon Printing Press
Apple MuGraph
New Digital Orchestra

January 1985 — Telecommunications

Interactive Video
The Dark Halls of MS-DOS
Phone Busts
Making Your Modem Dance
Grokking Modem7
HP Portable Review
JLS Mouse
Silicon Lathe
Modem7 for the Macintosh
Roland MPU-401 Review
Modem Survey
Blort! for the Apple
The Hacking of ZCPR2
BASterm for the IBM PC
Mixing up a Modem Program
Flexidraw for the 64

February 1985 — Home Computers

Commodore Plus 4 Review
Commodore 16 Review
iNet
ADAM Star Patrol
A Small Cat for CP/M
Searchmart
The WordStar Backrub
LIST! Special
Dem PC Utility Blues
Chirpee for the Commodore 64
Survey of Home Computers
Colour Computer Print Utility
Apple Encryption
PreBAS
The Keyboard

March 1985 — Computer Graphics

The Hitch Hiker's Guide to the Clone Stores
Hewlett Packard's Laser Printer
The Tandy 1200 Reviewed
Fresh Apples
Technical Drawing on the Mac
The Curse of All the BBS Numbers
Star Powertype Review
QuickDraw in BASIC on the Mac
The Art of the MDM Overlay
The Mortgage Program
BeatNix for CP/M
Assembling Graphics on the PC
Commodore Listing Debugger

CNI

Q: What do you get when you cross an Apple with an IBM?

A: A *FREE* software disk... if you subscribe NOW!

We've heard tell of many of our readers braving snapping winter frosts and slushy spring sidewalks just to pick up copies of their favourite Canadian magazines. The rumours appear to be true, and every time there's an influenza epidemic, the Board of Health raises their eyebrows at us.

Fortunately, there's an alternative to all this human suffering... and a very good one, indeed.

If you subscribe... or extend your subscription... to Computing Now!, Software Now! or Electronics Today magazine before the May issues go to press, we'll not only send you the best in Canadian publishing every month at a substantial savings over newsstand prices, but we'll also send you some software to keep you indoors... away from the cold and the viruses.

The Completely Free Software Disk is actually two disks in one. One side has a plethora of Apple DOS programs, and the other side is laden with IBM files. Blessed are the subscribers with access to both computers...

Side One: Apple DOS files

Apple Binary Encryption and Apple Binary Decryption, with source files: Programs to keep peering eyes from your valuable data. See the article in the February 1985 issue of CN!.

Racquel.Pic: An Apple HiRes implementation of the CP/M teletype drawing offered in Almost Free Software Volume II.

HGR Dump: A BASIC editor that lets you preselect options before sending your HiRes picture to the printer. Written for a Dumpling-GX card, but easily modified.

HGR Invert: A fast binary program that displays the 'negative' of any HiRes picture in memory. BRUNning it again restores the picture.

Magfiler: A magazine article database in AppleSoft BASIC. The February issue of CN! has already been entered to get you started.

Minature Golf: A binary HiRes game of golf, with a truly wicked course. The sixth hole's a dandy.

Memtest: This short, two-sector binary program comes in handy when your Apple starts to hiccup. It writes and reads to memory from \$8000 to \$BFFF. Three passes and your RAM's in fine shape.

Forced Read, with source: A short binary program originally appearing in Electronics Today, this program has incredible error handling.

APCP/M: A handy utility for the Applesoft user who also dabbles in CP/M, this program will read a text file up to 16K in length from an Apple CP/M disk and write it to a DOS disk. Known affectionately as 'Reverse APDOS'.

DM II: From the Apple User Group of Sweden comes forth this DOS modifying program that allows you to change commands, error messages, catalog headers and volumes, and even fiddle with DOS entry points.

Star Patrol: An Applesoft implementation of the HiRes ADAM program appearing in the February edition of CN!. Your mission is to shoot elusive space bats.

Attenuators: An Applesoft BASIC program to aid calculating resistance and loss.

Capacitors: A similarly Applesoft BASIC program to help calculate capacitance and frequency response.

Side Two: IBM files

SD: An acronym for Sorted Directory, this program produces a more visually appealing directory than can be had from the MS-DOS DIR command.

FORTH: A small BASIC implementation of FORTH. You can expand the primitives or add new ones as they become necessary.

Datafile: Everyone needs a database manager. This one's written in Microsoft BASIC.

Blueterm, with source: A terminal program for the PC. Suggested hardware requirements include a modem...

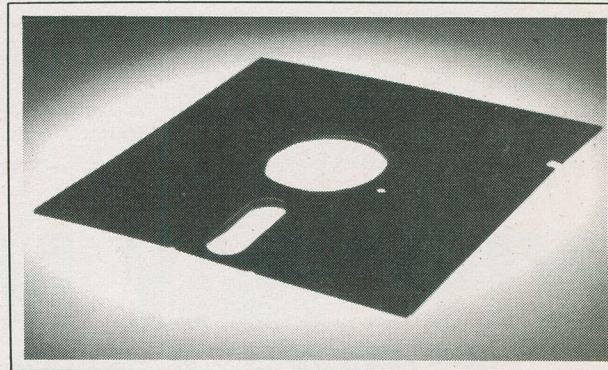
Poker: A BASIC program pitting you against your PC. Where's that straight flush when you need it?

Bandit: An alternative to that Las Vegas trip you've been planning. Appearing in the June issue of CN!, this BASIC program simulates a one-armed bandit.

CalcNOW!: A spreadsheet program written in BASIC. While very good at what it does, we don't expect Lotus to be nervous.

Cashacc: Written in BASIC, this is a cash acquisition and limited accounting package for the PC.

UnWS, with source: When you TYPE a WordStar file, you usually get garbage. This program strips the high bits from the WS file of your choice to make it legible again.



As its title implies, the Completely Free Software Disk is just that... **FREE**. However, it's only being offered to readers subscribing now or subscribers extending their present subscriptions, and only for a limited time. We regret that we'll be unable to supply the Completely Free Software Disk as a subscription bonus to orders postdated after **May 1, 1985**, so please subscribe or extend your subscription today to avoid disappointment.

From this point, you'll be able to run the applications programs, though it's suggested that you copy the files onto another disk.

All of the programs appearing on the Completely Free Software Disk have either been written in-house, or are believed to be in the public domain.

The Completely Free Software Disk is available only in Apple/IBM format.

SAVE UP TO 55% AND RECEIVE A FREE DISK!

To: **Moorshead Publications,
25 Overlea Blvd., Suite 601,
Toronto, Ontario, M4H 1B1 (416) 423-3262**

YES, please extend start my subscription(s) today! I understand that I may cancel my subscription at any time and receive a refund on the unexpired portion.

Computing Now!	1 Year \$22.95 <input type="checkbox"/>	2 Years \$37.95 <input type="checkbox"/>
Software Now!	1 Year \$19.95 <input type="checkbox"/>	2 Years \$34.95 <input type="checkbox"/>
Electronics Today	1 Year \$19.95 <input type="checkbox"/>	2 Years \$34.95 <input type="checkbox"/>

Cheque/Money Order enclosed. Visa MasterCard Am. Exp.

Card No. _____ Expiry Date _____

Name _____

Address _____

City _____

Province _____ Post Code _____

COMPUTER PRESS

continued from page 13

tape recorders. Your guess is as good as ours...

Other Apple news, not yet officially announced, has enhancements for the Apple //e computer in the works. In efforts to make the //e more compatible with the //c, Apple will be replacing the 6502 processors in their production //e computers with 65C02 processors and offering a kit to present Apple //e users.

The second planned enhancement is the replacing of the //e's ROMs for mouse interface support and to supply some text-graphic characters necessary for Mouse Paint.

Fast Company

At least two modem manufacturers are making efforts to further interest the public in their

2400 baud products, as well as 2400 baud communications in general.

Gandalf Data Limited is offering to buy back full-duplex 1200 baud modems from any North American users wishing to upgrade to Gandalf's 2400 baud SAM 24. 212 modem owners will receive a \$200.00 per modem credit when they initiate the trade. The standalone SAM 24 is priced at \$995.00 Canadian.

Atlanta-based U.S. Robotics Incorporated have reduced the American suggested retail price of their newly introduced 2400 baud modems 22 per cent, to \$699.00 from \$895.00. The price cut is effective for both their Courier 2400 and Microlink 2400 models.

Most 2400 baud modems aren't dedicated to 2400 baud communications exclusively, and are quite content to communicate with 300 and 1200 baud modems as well.

Software Survey

SOFTWARE NOW! — Featuring a major survey of over 1000 software packages, the latest issue of *Software Now!* is now on the stands. A valuable reference guide for Canadian personal computer owners and businesses, the survey provides straight facts on software for business, home, educational and technical applications. Along with program descriptions, the survey also includes hardware requirements, formats, Canadian list prices and company addresses for each product.

Correction

COMPUTING NOW! — The *Mortgage Program* appearing on page 48 of Computing Now!'s March 1985 issue is missing Line 10, a line number referenced on page 50. The missing line is a REM statement identifying the author as Jim Buchner of Pembroke, Ontario.

The **Brother 2024L dot matrix printer** is being distributed in Canada through *Sak Data Products*. Among its attributes, the printer offers a 24-pin matrix printhead with variable pitch control at 180 steps per inch, nine international character sets and several programmable fonts. Draft quality speed is 160 characters per second and letter quality is from 80 to 96 cps...



Other modem manufacturers offer warranties that vary from three months to two years — and are proud of it! One has even offered to extend their warranty for a fee.

Who cares? **Anchor Automation** is rocking the industry with a full **five year** no-charge warranty on **Volksmodem 12**.

Unbeatable Warranty

The warranty says simply: "We will repair or replace at our option — parts and labour — at no cost to the original owner for a full **five (5) years** from date of original purchase, any Anchor Automation Volksmodem 12 which fails in normal use..."

Unparalleled Compatibility

Software: The Volksmodem 12 is compatible with the "AT" command set used by Hayes and others.

Hardware: Inexpensive interface cables are readily available to connect the Volksmodem 12 to almost any computer on the market today (Or tomorrow!). The list currently covers almost everyone from Apple, Atari and Commodore to IBM, Tandy and Compaq — in fact almost 95% of the

machines on the market today made by almost anyone.

Speed: The Volksmodem 12 operates at both 300 and 1200 baud.

Ease of use: A built-in on-line help menu is always available.

Telephone: Volksmodem 12 simply

plugs into a standard modular wall jack. The phone plugs into the modem. When the modem is off, the phone works normally. And, because the Volksmodem 12 is D.O.C.* approved, its use will not disrupt telephone service.

Price: An amazing

\$399.00

*Department of Communications,
Government of Canada

Anchor Automation is distributed in Canada by Computron. Call or write for the dealer nearest you.

Toronto: 55 Torbay Road, Unit #2
Markham, Ontario L3R 1G7
(416) 477-0828

Head Office: 17507-107 Avenue
Edmonton, Alberta T5S 1E5
(403) 489-8400 Telex: 037-42881



Computron

Circle No. 2 on Reader Service Card

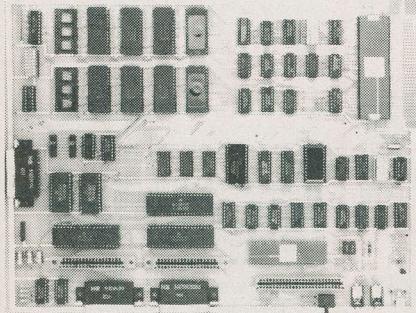
Canadian General Electric is distributing the Davong line of hard disks. Included in the distribution are the MultiLink — a LAN for

IBM PCs — and Mac Disk, hard storage for the Macintosh of up to 43 megabytes...

Covered by a one year warranty, the **Roland DG CC-121** RGB monitor is being distributed by *Amdek Electronics Canada*. Specifications include a crisp colour definition on a 12 inch jet black picture tube with a .37 millimeter pitch, special circuitry for difficult colours... such as brown... and a remarkably small 'footprint'...

Not a lot of IBM software is available on 720K diskettes, and IBM PC/AT users have noted problems when using some PC format IBM software. *Personal Computer Products* is offering **360K drives** for the PC/AT in either black or 'AT white'. The drives feature quiet operation and the same closing mechanism as the higher capacity PC/AT drives...

The **Microtrainer 68K** is a 68000-based single board computer designed especially for teaching microelectronics and microprocessors. Available from *Waterloo Distance Education*, the computer includes RS232 and parallel ports, card-edge sockets, a cassette interface and on-board RAM expandability up to 80K. Software includes an assembler/editor and a monitor/debugger...



Successful business presentations often require professional overhead transparencies. *Hewlett-Packard* is offering a free brochure entitled 'How to Design Effective Overhead Transparencies'. Offering tips on style, presentation and production, the brochure also shows how to design transparencies at about a dollar each using a computer and plotter...

Magic Screen from *Graphware* is both a set of 18 ampersand screen-handling utilities for Applesoft programmers and a screen designing program. The utilities will significantly help reduce data entry coding and debugging time. The screen generator allows simple screen design. Protected and unprotected fields as well as attributes for data entry fields may be specified...

Addresses: Gandalf Data Limited, 100 Colonade Road, Nepean, Ontario K2E 7M4 (613) 226-6500 • U.S. Robotics Incorporated, 8100 McCormick Boulevard, Skokie, Illinois 60076 (312) 982-5010 • Sak Data Products Limited, 1590 Matheson Boulevard, Unit 26, Mississauga, Ontario L4W 1J1 (416) 624-6763

- Canadian General Electric, 189 Dufferin Street, Toronto, Ontario M6K 1Y9 (416) 530-2918
- Amdek Electronics Canada Limited, 6691A Elmbridge Way, Richmond, British Columbia V7C 4N1 (604) 273-4453
- Personal Computer Products, 1400 Coleman Avenue, Suite C-18, Santa Clara, California 95050 (408) 988-0164
- Waterloo Distance

- Education Incorporated, 279 Weber Street North, Waterloo, Ontario N2J 3H8 (519) 884-4340
- Inquiries Manager, Customer Support Centre, Hewlett-Packard (Canada) Limited, 3710 Nashua Drive, Unit A-E, Mississauga, Ontario L4V 1M5
- Graphware Incorporated, 5084 Mosiman Road, Middletown, Ohio 45042 (513) 424-6733

TURBO PASCAL

- Fast, Fast, Fast!
- Lots of extensions
- Optional 8087 support
- Automatic Overlays
- Locates run-time errors in source code
- Available for IBM/PC/XT/jr., Apple CP/M, MS-DOS, CP/M-86, CCP/M-86 and CPM-Z80.

Only **\$69.95** (plus shipping)

8087 version

\$119.95

Turbo Tutor

\$49.95

Turbo Toolbox

\$69.95

SIDEKICK

For the IBM PC/XT/jr. and 100% compatibles

- A calculator
- An appointment calendar
- An ASCII table
- A notepad
- An auto dialer
- and much more

No matter what program your computer is running, just a single keystroke gives you access to all of Sidekick's features! Another keystroke, and you're back where you left off in your program.

Copy-protected version

\$69.95

Copyable version

\$109.95



PRAXTEK
COMPUTER CORPORATION

Praxtek Computer Corporation
514-880 Wellington Street
P.O. Box 2636, Stn. D
Ottawa, Ontario K1P 5W7

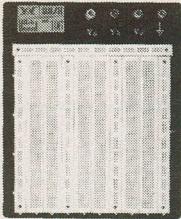
Tel:(613) 232-4225 Telex: 053-4332

We accept VISA and MasterCard, no cheques or purchase orders.

Dealer enquiries are welcomed.

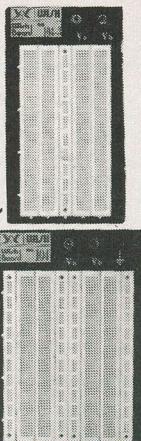
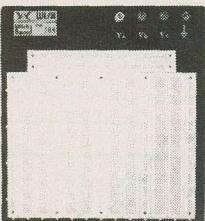
Circle No. 42 on Reader Service Card.

SOLDERLESS BREADBOARD

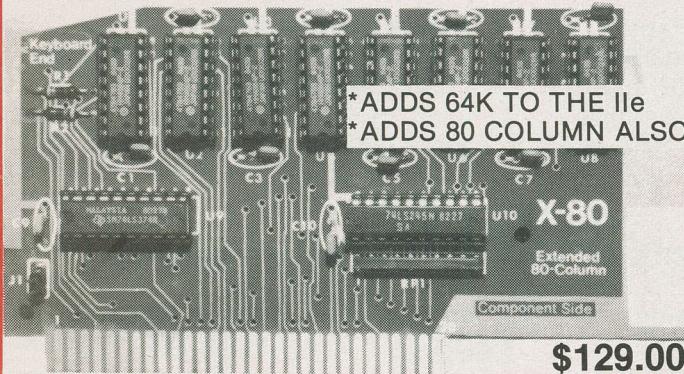


Solderless prototyping boards are the best way to quickly breadboard up a circuit. The holes are made especially for IC's, resistors, and other small parts with 22-28 gage wire leads, takes WW pins too.

WB-106	\$42.95
3 IC strips, 5 power strips	
4 Binding posts, Aluminum plate	
WB-104-3	\$29.95
2 IC strips, 1 power strip	
2 Binding posts, aluminum plate	
WB-108	\$59.95
4 IC strips, 7 power strips	
4 Binding posts, aluminum plate	
WB-104	\$33.95
2 IC strips, 4 power strips	
2 Binding posts, aluminum plate.	



EXTENDED 80 COLUMN for Apple IIe

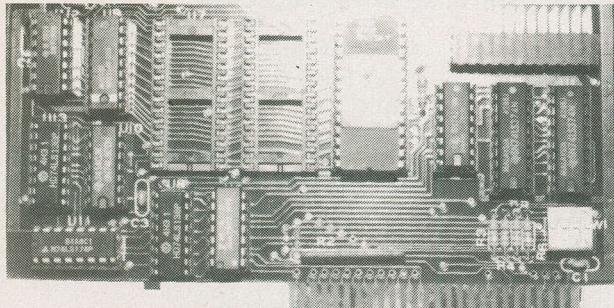


\$129.00

"NICE PRINT" APPLE II + , IIe CARD

An APPLE II +, APPLE IIe precision parallel printer card for use with EPSON and GEMINI (and similar) to generate multiple fonts, sizes and near letter quality printing. The printer steppers are controlled to give multiple and incremental strike capability to achieve the above.

COMPLETE WITH CABLE **\$119.00**



NICADS

**8.4V
4A.H
7 "D"
CELLS**

A great buy, a pack of 7 brand new GE NICADS giving 8.4v at 4 Amp hours. Each cell is 1.2v and separates easy. Used as 5V backup through a 7805. Gives 5v 1 Amp for 4 hours \$14.95



TRANSFORMERS

(A) Make an IBM linear supply good for 250 Watts. This unit gives +5v @ 20Amps +12v @ 10Amps and -5, 12 @ 1Amps. Unit gives the proper AC for above \$19.95
(B) 8VAC 5Amp \$ 9.95
(C) 8VAC, 5A, 25VAC, CT, 2.4A \$14.95
(D) 12VAC 1/2 Amp \$ 2.50
(E) 24VAC, 4Amps \$12.95
(F) 500 WATT ISOLATION/STEP UP/DOWN 110/220, 20 Lbs freight \$24.95
(G) 12VAC 3Amp \$ 7.95
(H) 8V12A, 25VCT, 3.4A, 22V, 4A made for a fully stuffed S-100 system \$24.95

CONNECTORS



DB SERIES

DB-25 M solder	\$1.95
DB-25 F solder	\$1.95
DB-25 M IDC, Flat cable	\$5.95
DB-25 F IDC, Flat cable	\$5.95
DB-25 M Right angle PCB	\$4.95
DB-25 F Right angle PCB	\$4.95
DB-25 Shell	\$1.00
DB-15 M solder	\$1.95
DB-15 F solder	\$1.95
DB-15 F IDC, flat cable	\$3.95
DB-15 M right angle PCB	\$2.95
DB-15 F right angle PCB	\$2.95
DB-15 Shell	\$1.00
DB-9 M solder	\$1.75
DB-9 F solder	\$1.75
DB-9 M right angle PCB	\$2.50
DB-9 F right angle PCB	\$2.50
DB-9 Shell	\$0.75

FLAT CABLE DRIVE CONNECTORS

50 Pin Edge C, 8" drive	\$5.95
40 Pin Edge C,	\$4.95
34 Pin Edge C, 5-1/4" drive	\$5.95
20 Pin Edge C, Hard drive	\$4.95
34 Pin Fem header 17 x 2	\$3.50
26 Pin Fem header 13 x 2	\$3.00
20 Pin Fem header 10 x 2	\$2.00
16 Pin Fem header 8 x 2	\$2.00
16 Pin DIP header	\$2.00
10 Pin Fem header 5 x 2	\$1.00

2 ROW STRAIGHT HEADERS

50 Pin 25 x 2	\$4.00
40 Pin 20 x 2	\$3.50
34 Pin 17 x 2	\$3.00
26 Pin 13 x 2	\$2.50
20 Pin 10 x 2	\$2.00
16 Pin 8 x 2	\$1.50
10 Pin 5 x 2	\$1.00

2 ROW RIGHT ANGLE HEADERS

40 Pin RA 20 x 2	\$3.50
34 Pin RA 17 x 2	\$3.00
26 Pin RA 13 x 2	\$2.50
20 Pin RA 10 x 2	\$2.00
16 Pin RA 8 x 2	\$1.50
10 Pin RA 5 x 2	\$1.00

1 ROW STRAIGHT HEADERS

Gold	\$8¢ per pin
Tin	\$4¢ per pin

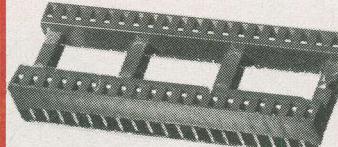
1 ROW RIGHT ANGLE HEADERS

Gold	\$8¢ per pin
Tin	\$4¢ per pin

CENTRONICS CONNECTORS

36 Pin solder cable male	\$8.95
36 Pin Flat cable make IDC	\$8.95
36 Pin Chassis female	\$6.95
S-100 Edge Connectors	\$2.50

SOCKETS



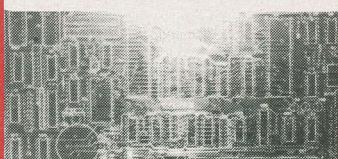
AMP IC SOCKETS

As you know AMP makes the best IC sockets. With a double wipe action and a very wide open target for easy insertion, the best.	
6, 8, 14, 16, 18, 20, 24, 28, 40	
Pin in stock at only	
1.5¢ PER PIN	

ASSORTED SEMI-CONDUCTORS AND OTHER STUFF

(A) RED LED S/M/L	10/\$1.00
(B) GREEN LED S/M/L	8/\$1.00
(C) AMBER LED S/M/L	8/\$1.00
(D) PIN PHOTODIODES, INFRA-RED	2/\$1.00
(E) PHOTO TRANSISTOR, NPN VISIBLE	2/\$1.00
(F) LDR (LIGHT DEP RESISTOR)	\$1.00
(G) FET ELECTRET MIKE, TINY 10MM	\$2.00
(H) 1N4001	10/\$1.00
(I) 1N4004	8/\$1.00
(J) 1N4007	6/\$1.00
(K) 25AMP-600V BRIDGE	\$2.95
(L) 25AMP-600V BRIDGE	\$3.50
(M) 6AMP-200V BRIDGE	\$1.50
(N) 3AMP-200V BRIDGE	\$1.00
(O) DIODE 3AMP-600V	3/\$1.00
(P) 1N914/1N4148 Silicon diode	10/\$1.00
(Q) 7805 1AMP-5V regulator	2/\$1.00
(R) 7812 1AMP-12V regulator	\$0.75
(S) 78M12 1/2 AMP-12V regulator	2/\$1.00
(T) LM317 Variable 1AMP regulator	\$1.50
(U) LM323 5V 3AMP regulator	\$2.95
(V) LM350 Variable 3AMP reg.	\$3.95
(W) 2 1/2" 80hm mini speaker	\$1.50
(Y) MINI TOGGLE SWITCH SPDT	\$1.95
(Y) MINI PUSH BUTTON SWITCH, NO	\$0.50

I/O + TWO



A clever copy of the AST I/O + TWO board with real time clock, game I/O calendar, and parallel and serial ports. A real good short card with assembly data \$24.95

GREAT IBM DEAL

Here's a new great IBM deal that is really good for those of you who are getting into your own system building. This deal includes:

- * ONE 8 SLOT HINGED LID IBM CASE
- * ONE MBE-XT 8 SLOT CPU BOARD
- * ONE 130 WATT POWER SUPPLY
- * ONE IBM STYLE KEYBOARD
- * ANY 4 BARE IBM PCB

All for \$475.00 A very good value if you were going to buy all this stuff anyway. Complete with all parts lists and assembly data. For same in Megaboard please add \$60.00. A real value.

GREAT CASE DEAL

This is a smaller deal than the above but still a very good one.

- * ONE 8 SLOT HINGED LID IBM CASE
- * ONE MBE-XT 8 SLOT CPU BOARD
- * ANY 4 BARE IBM PCB

All for \$199.00. A good value for any smart builder. With all parts lists and assembly data. For same in Megaboard please add \$60.00. A real value.

\$199.00

COMPUTER

PARTS GALORE INC.

316 College St.

Toronto, Ontario M5T 1S3

Toll Free Orders Only

1-800-387-1385

Order Checking (416)925-8291

Technical Data (416)925-1105

VEP 46 EPROM PROGRAMMER/ERASER

The VEP-46 programmer programs 16K to 128K EPROMS four at a time, with each bit programmable via the host computer. Will also erase up to 10 EPROMS at a time. Ideal for small production runs or EPROM development work. Specify Apple or IBM host adapter.

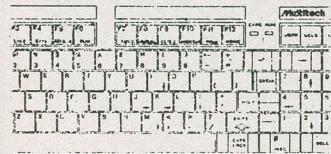
\$49.00

SWITCHING POWER SUPPLY

SPECs: + 5 VDC 5 AMPS MAX.
#1 + 12 VDC 2.8 AMPS MAX.
#2 + 12 VDC 2.0 AMPS MAX.
- 12 VDC 5 AMPS MAX.

INPUT: 115 or 230 VAC 60Hz A Best Buy at
\$49.95 each

APPLE® DETACHED KEYBOARD \$159.00



The excellent MAK-II Apple detached keyboard using serial cata (IBM) format. Plugs directly into Apple PCB

GREAT DEAL

THE GREAT DEAL CARRIES ON FOREVER AND GETS BETTER

Our proven 6502 motherboard plus a numeric case plus a black beauty power-supply plus a numeric function keyboard plus any 4 bare pcb for **\$225.00**

SOLID ABS CASE NUMERIC \$59.95

OUR 6502 BOARD

Now only **\$29.95** still with all the versatility of the original and a full 8 slots.



ASCII KEYBOARDS



Now, we have a new keyboard, micro controlled with 3 levels of pre-coded functions for Basic, CPM etc. and at the same old price as before.

Function Keyboard, Numeric **\$89.95**
Function Keyboard, Standard **\$79.95**

KEYTRONICS PROGRAMMABLE KEYBOARD

An excellent ASCII Keyboard, fully Apple Compatible. Full size with numeric pad, fully programmable key switches with full data..... **49.95**

POWER SUPPLY CSA APPROVED

Our Famous "BLACK BEAUTY" power supply, now reduced in price but not in quality. Our ratings are 5V-5A; 12V-2.5A; 5A-1/2 A; -12V-1/2A for real **\$79.95**

COMPUTER PARTS GALORE INC.

316 College St.
Toronto, Ontario M5T 1S3

Toll Free Orders Only 1-800-387-1385

Order Checking (416)925-8291
Technical Data (416)925-1105

MAIL ORDERS: We accept VISA; MC; AMEX; credit cards. Money orders, cheques (2 week wait) are also OK. Minimum packing and handling fee \$5.00 or 5%, whichever is larger. The only COD we use is via CANPAC (Add \$4.00 COD fee) or motor freight. We do not use postal COD at all. All Ont. res. add 7%. All prices are subject to change without notice. Returns are subject to a 20% restocking charge.

ASCII KEYBOARD



This is a high quality Hall Effect keyboard made by Microswitch of Canada for AES data and now bought by us for 10% of the \$169.00 that AES paid for them in 10,000 lots. They are a very good word processing keyboard with both serial and parallel data outputs for use with APPLE and IBM type systems and come complete with a ribbon cable connector and complete pinout. **\$24.95**

WIRED CARDS

16K	\$ 45.00	Appaext 128K	\$140.00
128K no IC	\$ 34.95	Sprite.gr	\$ 69.95
128K OK	\$ 55.00	TMS9918A IC	\$ 18.95
128 64K	\$ 99.00	DISC SHMRCK	\$ 45.00
128K 128K	\$150.00	80 Column	\$ 65.00
MC3242 IC	\$ 12.00	80 Col. Softw	\$ 69.00
DISC	\$ 45.00	Nice Print	\$ 69.95
Z-80	\$ 45.00	Gripper	\$ 50.00
Applocard	\$150.00	Grip cable	\$ 19.95

NEW LOW BARE PCB PRICES*

GROUP 1	\$ 7.00 each
Real time clock	• PIA card
Rana 4 drive	• EPROM
9 V Music	• WILD CARD
Disc Controller	• SAM TALKS
Disc Controller (Shamrock)	• COMMUNICATIONS
GROUP 2	\$ 9.00 each
Gripper	• RGB
80 Column	• Sprite graphics
80 Column Soft	• APPLACARD 128K ADD ON
Z-80	
GROUP 3	\$ 11.00 each
SSM MODEM	• APPLACARD • APPARAT EPROM PROG • 16K • 128K

All boards come with a parts list and placement diagram. We have all the parts of the PCB's just ask for them.

*Prices so low we require payment with order.

MEMORY FLASH

256K-150Ns DRAM	\$19.75
64K-150Ns DRAM	\$ 3.25
64K-200Ns DRAM	\$ 3.25

Prime stock, limited quantity.

SWITCHING P.S.



Another great bargain from PARTS GALORE. A small power supply switching style that give +5v-4A; ±12v 1A and -5v (adjustable) on a compact 4x8" open frame PCB. Cost Northern Telecom \$50.00 when they bought 5000 pieces. We got em when a subcontractor went belly up for 10% of that price and we are selling em for **\$18.95** NEW IN BOX TESTED AC power cable (3 Wire) for above .. \$2.50

NEW!

IBM is a registered trademark of International Business Machines

DTC DISPLAY TELECOMMUNICATIONS CORPORATION

Eight Compatible I/O Interface Connectors

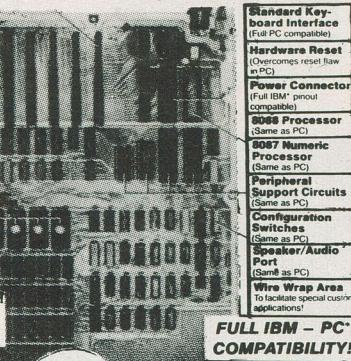
(Full PC compatible) (comes with all IBM-PC plug-in cards)
Special J1 Interface
(Allows horizontal mounting of compatible connectors on easy bus expansion and custom configuring) (Board has 62 pin gold plated contacts)

Extended ROM Capability

(Runs all compatible PC ROMS) (memory compatible to accommodate all popular 8K, 16K, 32K and 64K RAMS) VPI RAM and NEW EE ROMS VPI RAMs now available for EP ROM burning!) (External VPP voltage required)

Full Mega-Byte Ram Capacity!

On Board!
(With parity)
□ 56K Bytes using 4K chips
□ 1M Bytes using 256K chips



Standard Keyboard Interface (Full PC compatible)

Hardware Reset (Overcomes reset flaw in PC)

Power Connector (Full IBM® pinout compatible)

8088 Processor (Same as PCI)

8087 Numeric Processor (Same as PCI)

Peripheral Support Circuits (Same as PCI)

Configuration Switches (Same as PCI)

Speaker/Audio Port (Same as PCI)

Wire Wrap Area To facilitate special custom applications!

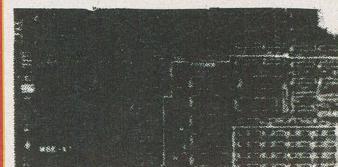
FULL IBM - PC COMPATIBILITY!

ONLY!
\$99.95
Evaluation Board Kit

MEGA-BOARD® Evaluation Board Kit! (Blank board with full assembly instructions and parts list.) Includes highest quality PC board with gold plating, silk screen, solder mask.

MBE-XT

\$49.95



Here it is, a 256K XT compatible 8088 machine that works like an IBM. Note has 8 slots on 0.8" spacing to use modern XT peripherals, unlike the BEST which has only 5 on 1" spacing. The MBE-XT will hold any legal or illegal BIOS or BASIC. We suggest the MEGABIOS, one of the better ones available.

- (A) MBE-XT with assembly data and parts list
- (B) Complete schematics and manual \$ 4.95
- (C) Wave soldered MBE-XT board without any IC's, all sockets, edge con. R.C. Etchwith manual and full schematics. You just add IC's
- (D) As above but fully stuffed with all IC's and 64K of RAM on board with BIOS and M&S

SA/455A3 5-1/4" HALF SIZE DRIVES

- 40 Track per side
- Double-sided, double density
- Latest head & drive technology
- Fast access time

Two of These Half Size Drives will Fit in the Same Space as 1 Full Size Drive!

CHERRY IBM® STYLE KEYBOARD

At last a good low cost keyboard for the IBM PC, XT or compatible machine. Uses capacitive keys, has a very good feel", and has TYPEWRITER LAYOUT for easy word-processing at the very low price of **\$124.00**

IBM CASE

We have the case for you, the newest type with 8 slots to the MBE-XT board, has hinged lid and all mounting hardware

\$89.95

Economy Version

\$74.95

Same as above for MEGABOARD, 7 Slot

\$99.95

Older type, top opening for Apple PCB to look like IBM system, holds 2 drives. **\$69.95**

SWITCHING POWER SUPPLY

110V, 60Hz with Fan and two rear switched outlets. These power supplies fit the above case

100 WATT + 5v--10A; + 12v-3.5A; ±12V-1/2A

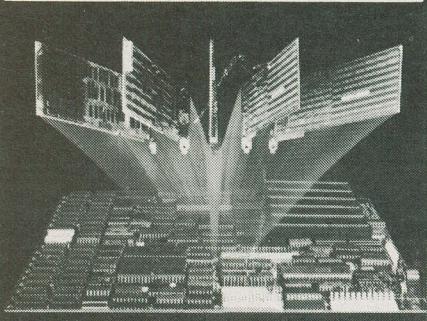
\$139.00

130WATT + 5V-14A; + 12V-4.2A; ±12V-1/2A

\$169.00

**INTRODUCING:
THE NEW STANDARD
FOR IBM PC/XT
COMPATIBILITY**

The ACS-1000 Super Computer



- 1 Megabyte On-Board Memory
- Built-in Disk Controller
 - up to 4 Floppies
 - SASI Hard Disk Interface
- 32 KB User Definable ROM
- Switchable: 4.77 or 8 MHZ
- Built-in Multifunction Board
 - Parallel Printer Port
 - 2 Serial Ports
 - Time-of-day Clock

Seize Control of Your Hardware Destiny

If you are using board level microcomputers you can have greater power, versatility and reliability by using the ACS-1000 single board Super Computer.

The ACS-1000 is compatible with both software and hardware designed for the IBM PC/XT. It even has the same mounting holes and the same power supply connections. The difference that the ACS-1000 offers a much higher level of integration and costs less than \$500 when ordered in quantity.

Save your Expansion Slots for true expansion Disk Controllers, I/O ports and extensive memory are already built-in, simplifying production and freeing the 6 expansion slots to take on specialized work of your process control, CAD/CAM or office automation applications. There's even a special port for a low cost piggyback modem.

See for yourself. For a limited time we are offering a system evaluation kit for \$950. The 128K system includes bios, documentation, and an XT compatible power supply.

To order call 604-888-2606 or write:

Soltech Industries Inc.
9274 — 194th Street
Surrey, B.C. V3T 4W2

IBM, PC, XT and PC DOS are registered trademarks of IBM Corporation.

Circle No. 36 on Reader Service Card.

MPF-PC

"More talented than the others!"

Offers You More For Less!

**The MPF-PC
from . . .**



**Multitech
The Symbol
of
Original Design
and
Quality**



***IBM-PC Compatibility. . .And More**

The stylish MPF-PC is designed to run the vast amount of IBM-PC software, such as Lotus 1-2-3, Framework, Symphony, Sidekick, AutoCad, Flight Simulator, etc. It has five full-length expansion slots to take a variety of plug-in peripheral cards for the IBM-PC.

***Multitasking/Windowing. . .And More**

The key to the enhanced productivity offered by MPF-PC is the ability to perform up to four different tasks at the same time and display them on the monitor with split screens. Any screen can be enlarged to occupy the entire monitor display providing user convenience. The user can print a lengthy report, sort through a database and still make forecasts all concurrently. Being able to handle so many aspects at one time not only increases productivity, but also profitability and quality of work.

***Two Operating Systems. . .And More**

With Digital Research's latest Concurrent CP/M-86 and Microsoft's popular MS-DOS operating systems, the MPF-PC can adapt to application software written for both environments. What more can you ask for?

***Ready To Go Bundled Software. . .And More**

The MPF-PC comes with a powerful integrated software. . .T/Maker III. With T/Maker's integrated word processing, spelling checker, electronic spreadsheet, relational database and bar-chart graphics, you can begin to write reports, analyse expenses, forecast sales, plan budgets, file customer lists, chart productions. . .and more!

***Ready To Go Hardware. . .And More**

The MPF-PC standard features include 8088 CPU (socket for 8087), 256K RAM, a colour graphics board, a RS-232C serial communications port, a Centronics parallel printer port, 90-key detachable keyboard, and dual ds/dd disk drives. Many more options available. For example, the MPF-PC/XT has a 10MB hard disk.

**Clearly
The Best Buy! Only \$2499.00***

(monitor not included)

*Plus freight where applicable.



Exclusively distributed by:

TITHES BUSINESS SYSTEMS (CANADA) INC.
971 W. Broadway, Vancouver, B.C. Canada V5Z 1K3
Tel: (604) 733-8999 Telex: 04-53436

Dealers'
Inquiries
Invited

Circle No. 31 on Reader Service Card.

Product Mart

Where Buyers Find Sellers

SOFTWARE for all leading computers at discount prices. Tell us your computer model and receive our free catalog. **COMP-CAN**, 1477 Hunt St., Sarnia, Ont. N7S 3M8.

FANTASTIC SAVINGS EPROM's first quality branded stock 2732 (450 ns)... \$6.49, 2764 (300 ns)... \$7.99, 2716 (450 ns)... \$4.99, **GB ELECTRONICS**, Box 24, 206 - 6414 Travois Place, N.W. Calgary, Alberta, T2K 3T2. Add \$2.50 Shipping.

ALL kinds of electronic projects and books. Send self addressed stamped envelope for free catalogue. **SIMPLIFIED TECHNOLOGIES**, 214 King St. E., Hamilton, Ontario, L8N 1B5. Special this month, Free C.O.D.'s.

SOFTWARE CLEARANCE \$9.95 for VIC20, TI99/4A, Atari & TRS80 Free listing, specify computer **T.M. COMPUTERS**, 786 Bath Road, Kingston, Ontario K7M 4Y2.

SOFTWARE - Hardware - Computers Apple & Compatible 50 page catalogue. Send \$3.00 to cover postage and handling. No Prov. Sales Tax. **COMPUTER DISTRIBUTORS**, P.O. Box 8217, Stn. 'F' Calgary, Alberta T2J 2V4.

APPLE SOFTWARE RENTAL. The Pacific Apple Computer Club lists over 500 apple programs. Most rentals only \$6.00 you keep the disk. For catalog send \$1.00 Canadian to **P.A.C.C.** Box 25, Point Roberts W.A., 98281.

Advertising in the Product Mart section allows you to reach thousands of Canadian readers nation wide effectively and economically. Please contact Dierdre Whitehead, Advertising Service Manager, (416) 423-3262, for further details on the various sizes and styles available.

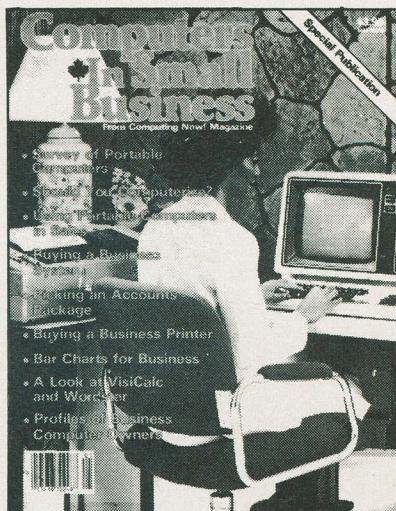
WHAT DO YOU DO?

Send us your typewritten or clearly printed words, your permanent address and telephone number and your payment (no cash please). Make your cheque or money order payable to Moorhead Publications. We're at Suite 601, 25 Overlea Blvd., Toronto, Ontario, M4H 1B1.

WHAT DO WE DO?

We typeset your words (and put the first word and your company name in **BOLD** capital letters). Your advertisement will appear in the first available issue.

Computers In Small Business



Small companies across Canada are hungry for knowledge about the microcomputer revolution. Many of them believe that they alone are ignorant about what is going on and what equipment is available.

This Special publication is addressed exclusively to this market. The articles comprise reprints of the very best material already published in *Computing Now!* magazine together with several specially commissioned features to form a well balanced publication. We believe this Special is of real use to the hundreds of thousands of small companies on the verge of buying a micro-computer.

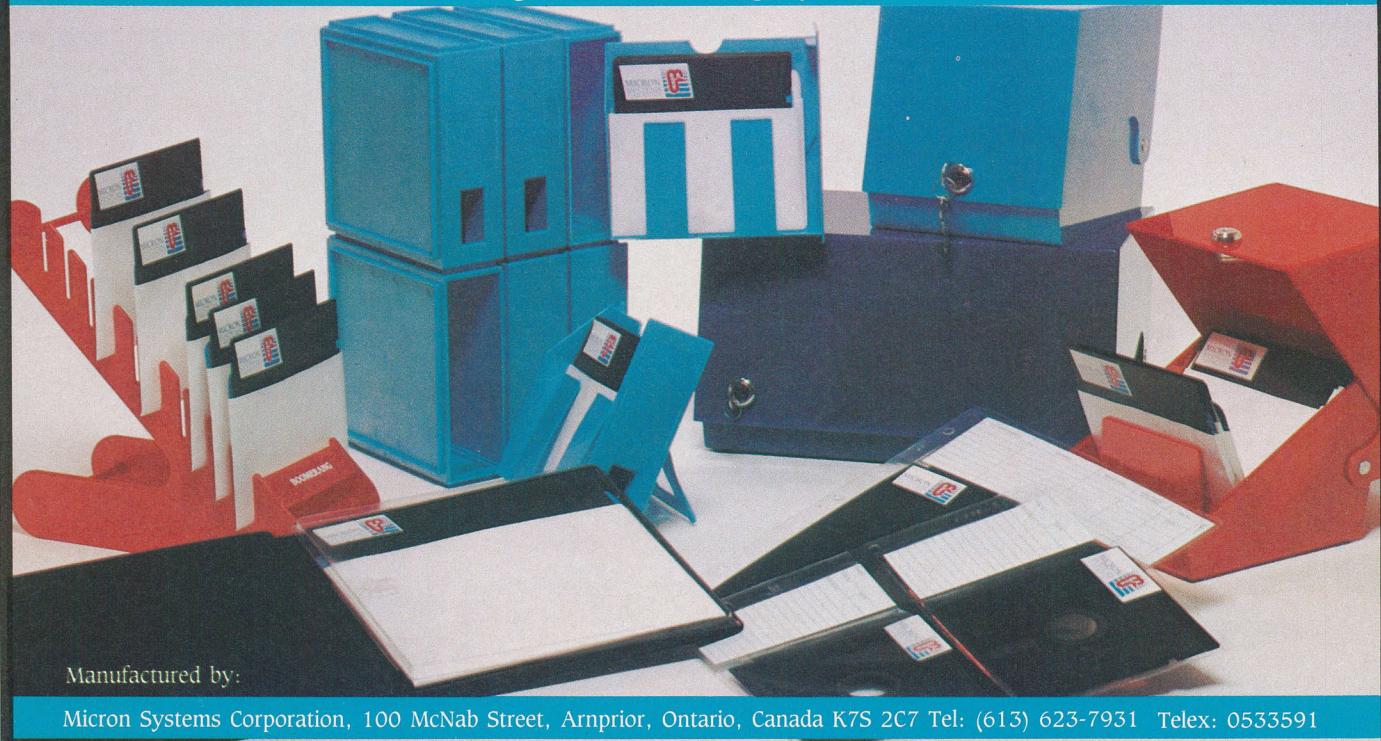
First Published March 1984

\$3.95 plus \$1.00 postage and handling. Ontario Residents add 7% PST. For a copy call (416) 423-3262 or write:

Moorhead Publications
25 Overlea Boulevard,
Suite 601,
Toronto, Ontario, M4H 1B1

OUR HARDWARE GROWS WITH YOUR SOFTWARE

Magnetic Media Storage Systems



Manufactured by:

Micron Systems Corporation, 100 McNab Street, Arnprior, Ontario, Canada K7S 2C7 Tel: (613) 623-7931 Telex: 0533591

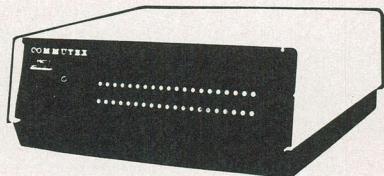
Circle No. 52 on Reader Service Card.

Computing Now! — Advertisers Index

Advance Interface Electronics Inc	53
Budgetron Inc.	28, 57
CAW Displays	35
Chameleon Universal Products	66
Computer Mail Order	21
Computer Parts Galore	74, 75
Computron	4, 69, 72
Comspec Communications Inc.	60
Copp, Clark, Pitman Ltd.	catalogue
Dana's Computer Discounts	38, 43
Dennison Manufacturing Canada Inc.	51
Electronic Control Systems	66
Emulex Corporation	6
Exceltronix	2, catalogue
Gentek Computers Inc.	67
Grifco Marketing Inc.	80
Hunter Nichols	79
IBM Canada Ltd.	7
Kitstronic International Ltd.	62
LOGIC	45
Management Graphics	67
Memorex	25
Microhmea Electronics	11
Micron Systems Corp.	78
Phase 4 Distributors Inc.	33
Praxtek Computer Corp.	73
Programmers Guild	19
Protec Microsystems Inc.	78
Soltech Industries Inc.	76
Surplustronics	3
Tithes Business Systems (Canada) Inc.	76
Canada Remote Systems	45
Tycor Electronic Products Ltd.	48

COMMUTEX

A SYSTEM DESIGNED FOR AN EFFICIENT MANAGEMENT OF A LIMITED NUMBER OF PRINTERS SHARED BY SEVERAL MICRO-COMPUTERS.



This intelligent controller features:

- Menu-Driven software configuration.
- No manual commutation.
- Use of different types of printers and computers.
- Up to 40 computers and printers can be handled by **CommuteX**.

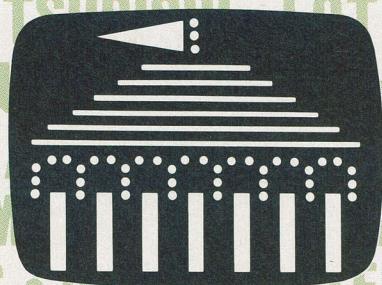
Obviously there is a lot more to tell about **CommuteX**.

For more information please write or call:

PROTEC MICROSYSTEMES INC.
725 Decarie, Suite 202
St-Laurent, Que. H4L 3L4
Tel.: (514) 744-3367
Tlx: 05-25134/PROTEC

Circle No. 6 on Reader Service Card

AEROMA • TELEVIDEO • LOTUS SYMPhONY • KODAK • 3M •
DYSAN • KODAK • 3M • APPLE • OLIVETTI • ATARI • COM
IANNESMANN TALLY • IBM • AMDEK • LOTUS 1-2-3 • P
LAROID • ERICSSON • HEWLETT PACKARD • VISI CALC
DORE • CORONA • MITSUBISHI • LOTUS • OKIDATA • VISI
RY • TELEVIDEO • LOTUS • XEROX • IBM • AMD
LOTUS 1-2-3 • POL • SON • 3M • APPLE • (•
ANYO • ATARI • COM • ZONA • MANNESMAN
ITSUBISHI • LOTUS • TELEVIDEO • LOTUS SY
PERRY • HEWLETT • VISI CALC • SANYO • AM
OLIVETTI • POLAROID • ISON • ATARI • MITSUBIS



COMPUTER FAIR

A professional approach to computer shopping

Thousands of computer solutions under one roof. The Metro Toronto Convention Centre.

You could spend weeks or months going from vendor to vendor looking for the right computer equipment. Or you could spend a few hours at the third annual Computer Fair.

You'll see hundreds of booths. Hardware, software, peripherals, everything under the sun. You'll see new products and new applications from all the key companies in the industry. It doesn't take a computer to tell you that this is the best way to go shopping.

Touch, look, listen.

Want a hands-on demonstration? How about a seminar or workshop? Or maybe you just want to talk and collect information. Whatever you're looking for, you will find more business solutions here than anywhere else. This is the time to take a few hours to accomplish what would usually take forever.

Easy to get to whether you're driving, riding, or walking.

What a place for a Fair! The Metro Toronto Convention Centre is steps from the TTC, Union Station, and all of the downtown business core. For out of town guests, there are thousands of hotel rooms within a 5 minute walk.

Wherever you are, if you can see the CN Tower, you know where to find Computer Fair.

HARDWARE, SOFTWARE, BUSINESSWARE.

Metro Toronto Convention Centre

255 Front Street West, Toronto, Ontario Registration - \$8.00
Wednesday Thursday
May 8 May 9
Friday Saturday
May 10 May 11

A HUNTER NICHOLS PRESENTATION
721 Progress Avenue, Scarborough, Ontario, M1H 2W7 (416) 439-4140



Maxell Gold.

The floppy disk that
packs more facts
into Compaq,
sets HP® free,
and takes IBM®
Portable where it's
never gone before.

It's great to have a portable computer.
Especially when your data stays put.
For error-free performance at home or
abroad, trust Maxell. The Gold Standard
in floppy disks. There's a Maxell disk
for virtually every computer made.
Each is backed by a lifetime warranty.
Maxell. Accepted everywhere,
without reservation.

Griffco

Griffco Marketing Inc.

maxell
IT'S WORTH IT.

